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ABSTRACT

This report contains speeches and notes of workshop participants meeting to discuss school planning. Participants included educators, architects, engineers, and contractors. Twenty-two selections cover such topics as open plan schools, instructional materials centers, site selection, fire protection, environmental control, the school as a community center, and team planning in construction systems for buildings. Related documents are EA 002 877, EA 003 048, and EA 003 050. (MLF)



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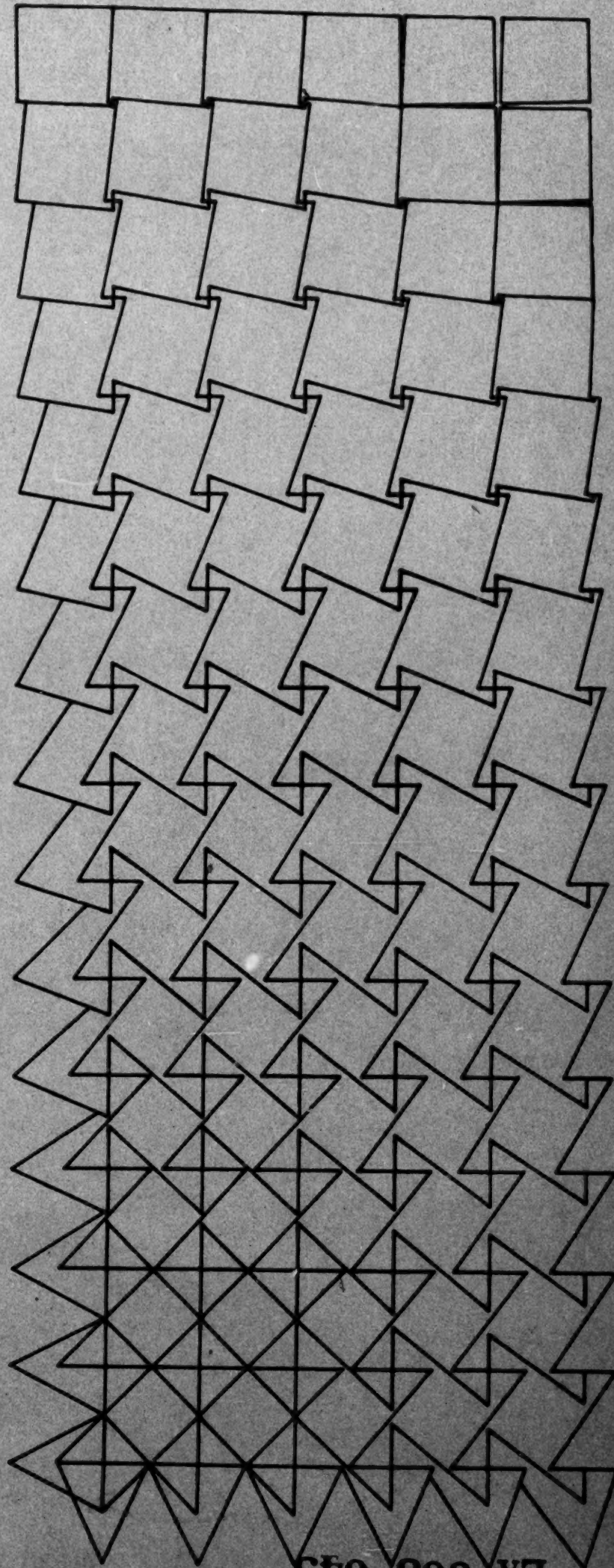
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**School Design Workshop/11
Windsor, Ontario
March 10-11, 1970**

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The Eleventh Regional School
Design Workshop
Holiday Inn
Windsor
March 10th and 11th, 1970

The attached speeches and
notes are exact copies of
material received from
participants at the
completion of the Workshop

SCHOOL PLANNING AND BUILDING
RESEARCH SECTION
ONTARIO DEPARTMENT OF EDUCATION

I N D E X

Page

OPENING WORKSHOP ADDRESS

by S. T. Orłowski, Chief Research Architect, School Planning and Building Research Section, Ontario Department of Education, Toronto, Ontario.....

1

OUTLOOK FOR EDUCATION

by C. R. MacLeod, Director of Education, Windsor Board of Education, Windsor, Ontario.....

2 - 6

OPEN PLAN SCHOOLS

by P. F. Wiseman, Group Chairman, Curriculum Section, Ontario Department of Education, Toronto, Ontario.....

6 - 7

OPEN PLAN SCHOOLS

by R. D. Schoales, Architect, Nicol Schoales Ream McBain, Toronto, Ontario.....

7 - 8

MEDIA CENTRE

by D. G. Bagshaw, Assistant Superintendent, Curriculum Section, Ontario Department of Education, Toronto, Ontario.....

9 - 10

THE LEARNING MATERIALS CENTRE

by J. Bobaljik, Architect, Johnson-McWhinnie Architects, Windsor Ontario.....

10 - 12

SCHOOL SITE AS A TEACHING AREA

by R. B. Johnson, Johnson Sustromk Weinstein & Associates Limited Landscape Architects, Toronto, Ontario.....

13 - 15

SCHOOL SITE AS A TEACHING AREA

by N. Massey, Assistant Superintendent, Curriculum Section, Ontario Department of Education, Toronto, Ontario.....

16

GRANTS FOR SCHOOL BUILDINGS AND THE EFFECT ON DESIGN

by D. Russell, Chief School Approvals Consulting Architect, School Plant Approvals, Ontario Department of Education, Toronto Ontario.....

17 - 18

GRANTS FOR SCHOOL BUILDINGS AND THE EFFECT ON DESIGN

by J. C. Couchman, Architect, J. P. Thomson Associates, Windsor, Ontario.....

19 - 20

USER'S REACTION TO CONTEMPORARY SCHOOL DESIGN

by D. Tighe, Senior Student, Assumption High School, Windsor, Ontario.....

21

USER'S REACTION TO CONTEMPORARY SCHOOL DESIGN

by P. J. Papineau, Custodian, St. Patrick Separate School, Windsor Ontario.....

21

CENTENNIAL SECONDARY SCHOOL

Principal, B. W. Brown, Windsor, Ontario.....

22 - 23

EDUCATION TOMORROW

by Dr. D. Cappon, Professor, Faculty of Environmental Studies York University, Toronto, Ontario.....

23 - 28

FIRE SAFETY REQUIREMENTS FOR SCHOOL DESIGN

by K. G. Reilly, Approvals Engineer, Fire Engineering Section, Office of the Fire Marshal, Toronto, Ontario.....

28 - 32

CONTROL OF ENVIRONMENT

by J. G. Haywood, Vice President, Elgin Industrial Consultants, St. Thomas, Ontario.....

32 - 36

CONTROL OF ENVIRONMENT

by G. F. Costello, Supervisor of Buildings, Middlesex Combined Roman Catholic Separate School Board, London, Ontario.....

37 - 38

THE SCHOOL AS A COMMUNITY CENTRE

by G. H. Miller, Assistant Superintendent, Youth and Recreation Ontario Department of Education, London, Ontario.....

38 - 39

THE SCHOOL AS A COMMUNITY CENTRE

by E. H. Brohman, Superintendent of Program, Lambton County Board of Education, Sarnia, Ontario.....

40 - 41

THE SCHOOL AS A COMMUNITY CENTRE

by L. Kirk, Chairman, Parks and Recreation Board for the City of Sarnia, Sarnia, Ontario.....

42 - 43

TEAM PLANNING IN CONSTRUCTION SYSTEMS FOR BUILDINGS

by H. J. Vallery, Superintendent of Academic Studies, Metropolitan Toronto School Board, Toronto, Ontario.....

43 - 49

TEAM PLANNING IN CONSTRUCTION SYSTEMS FOR BUILDINGS

by J. U. Moreau, L'Institut de Recherches et de Normalisations Economiques et Scientifiques Inc., Montreal, Quebec.....

49 - 50

OPENING ADDRESS by S.T. Orlowski

Ladies and gentlemen, it is my great pleasure to welcome you to our School Design Workshop in Windsor. I always look forward to our Workshops, although I must admit that sometimes I also dread the preparation time - deciding whom to ask to speak is a very difficult job. There are so many people with interesting ideas in the educational field that it is very hard to decide whom to include. I am always glad when we have reached this moment - all the preparations are behind us - it is too late to make any changes - and too early to worry about the outcome of the conference.

In the past few years, we have had many such conferences in various parts of the Province and at times I feel like the manager of a travelling circus - during the past year Thunder Bay, Ottawa, Peterborough and now Windsor have hosted our discussions and deliberations. I like to think that all our gatherings are very profitable to both the participants and the Department of Education. By working together searching for answers to our problems - I hope we are coming to the right conclusions that will save us from making unnecessary and costly mistakes in the design of our educational buildings.

We are interested in, as Dr. Harold Gores, President of Educational Facilities Laboratories in New York, described it at our last conference in Ottawa, "The solids of education, anything you can with impunity kick with your foot, rather than the gases of education like the curriculum or the other philosophical matters". But we cannot disregard these "gases of education" because they have to be given an architectural form, and it is up to architects and engineers to make it happen.

To design buildings that are both functional and make a positive contribution to our visual environment is not an easy job. I would even venture to quote Mr. David Medd, who recently gave a lecture on designing, for people at the Institute of Advanced Architectural Studies, University of York in England that "buildings that are significant to architects tend not to be so to others, and buildings that are enjoyed by their owners and users are often those that are not significant to architects".

Of course, we must try to satisfy both needs - that of usefulness and that of aesthetics, because environment also plays an important role in the life of the students. Dr. Stanford C. Ericksen, writing in a University of Michigan publication, estimated that 25% of all learning may be accounted for by the effects of physical environment alone. Economists will not let us forget the importance of building within the budget. What we are all looking for are schools that work well, look attractive, and don't overstrain our financial resources.

Last, but not least, I would like to remind you that the good and careful planning of schools will -

- help to improve the standards of education
- provide facilities that can adequately handle the demands of the community
- help to attract professional personnel
- facilitate the introduction of the new technological hardware
- funds will be used effectively
- cost will be prevented from increasing too rapidly
- schools will receive Department support for their needs
- the community will favour the well planned project and support it

It is only fair to warn you that good planning is difficult, but after all that is the reason we are here - to define our needs and to study methods to satisfy our requirements.

THE OUTLOOK FOR EDUCATION IN THE 70's by C. R. MacLeod

I extend a warm welcome to all delegates at this School Design Workshop in Windsor and I trust that you will find it to be interesting and profitable.

I have been asked to speak to you today on the subject, "The Outlook for Education". The title seems to suggest that I should peer, to some extent at least, into the future and indicate a few startling trends which may emerge. I was first tempted, like Tennyson, to, "dip into the future as far as the human eye could see", but my problem was that I couldn't see very far. In fact, after you hear my remarks, you may feel like the woman who went to hear a Dominican Priest speak on the subject of Family Life. On the way out, dragging six children, she was heard to say, "I wish I knew as little about the subject as he does". One thing about which we can be certain is that there will be changes, but I am always a little dismayed and sometimes disgusted by those who engage in pure speculation for the sake of notoriety, or who over-simplify problems in order to catch the popular imagination. Recently, I read such a prophecy when a would-be seer indicated that in the year 2,000 properly programmed materials would enable students to progress so that no additional training in the basic skills of reading, writing, spelling and grammar would be required after grade one. I fear that my outlook for education is not so startlingly radical nor optimistic.

The joys and agonies of change

I should like, rather, to indicate changes or trends or aspects of education which are beginning to happen and which I believe should happen in the next ten years, and to give some indication of the perspective in which I should like to see them develop.

I believe in change, as I feel that it is a great source of stimulation and motivation for both students and teachers, but change should lead to progress and not all change does. A poet once wrote, "Change and decay in all around I see". If good judgment and common sense are not exercised in the implementation of change, that statement may well apply to education.

Progressive education, for example, as espoused by Dewey, contained much that was sound, such as, the importance of the individual, of interest, of freedom, and of activity in learning. It was wrong, however, I believe, in its attack on scholarship, on the importance of factual knowledge, and on its refusal to establish a priority of goals leaving the implication that one goal could not be placed above another. The result was that, while progressive education flourished for a short time, it gradually withered and

recently one writer made the observation, "We are now at the end of the national insanity known as progressive education".

It appears that from time to time educators are overcome by recurrent cycles of certainty and they exaggerate the adequacy of some illuminating insight to correct the ills of our infinitely complex educational enterprise. Many educators seem to fall into the error of believing that it is necessary to be AGAINST something in order to be FOR something else. An impression is frequently made that what is being carried on now is entirely wrong and only by a full swing of the pendulum can improvement result. I should like to warn you against such false prophets.

Many educators have been studying the Hall-Dennis report; it is a report which contains many excellent suggestions which, if properly implemented, can lead to major improvements in education in this Province. There is, however, much evidence that educators are interpreting the recommendations, as happens so frequently, from an either-or position. If they take an extreme view, if they tend to wander from ditch to ditch, then I believe that the outlook for education in the years ahead will be gloomy indeed. A fly, riding on the back of a wagon as it travelled over a dusty road, looked back and said, "My! look at all the dust I am kicking up." We don't have to kick up a lot of dust in order to make meaningful and relevant changes in education.

I should like to refer to a few changes which, I believe, will be evident in the 70's. I hasten to add that many of these are already being initiated, but they will come into much wider use and more general acceptance.

Individual progress to meet individual differences

It is almost universally recognized today that students differ greatly, some have five talents, some two talents and some one talent. Since starting to teach, I have seen thousands of children going through school. No two of them enter with the same potential and no two leave with the same attainment. Under God's system of creating people, it couldn't be different. In caring for this never-ending procession, teachers do not throw back to society those who cannot be successful. Running a school is not like running a production line in which the supervisor throws out the culls. Recent research seems to indicate that an enriched environment will produce a better brain and increase the ability to solve problems. Through stimulation, the sharpening of sensory perception, verbalization, the encouragement of inquiry and the provision of warmth and affection, we are told that it is possible to raise a child's ability to do school work.

These facts are being more generally recognized by educators and at no time

in the history of public education, I believe, have more urgent and realistic steps been taken to provide for the individual progress of students and to plan for their individual differences. At the elementary level, particularly, through the use of open concept classrooms, through the grouping of students, through individual assignments, through the more effective use of teachers' abilities in team teaching and through research in library resource centres, great strides are being made in the individual growth patterns of students.

At the secondary school level, too, changes in organization are making individual progress a reality. The following are some of the significant changes: a credit system, individual timetables, wider range of options, the elimination of the three branches, different levels of subject content, the use of a semester system and the introduction of summer school for credit. These will assure greater flexibility in the interests of individual students. In the next few years these changes will prove so highly significant that they will be in general use throughout the province and should make a tremendous impact on the education of our young people.

Organizational procedures, however, are merely a means to an end and the real end is the quality of the program which will become available to meet the interests and needs of the students.

Programs to meet the needs of the students

If a student is not interested in a course or sees little relevance in it for him, it will serve very little purpose. The desires of students should be known. I would hope, however, that courses would not be offered, nor selected, merely on the whims of inexperienced students. Surely the knowledge, the experience, and the wisdom of a professional educator will also greatly affect the educational program. There are those who would abdicate this responsibility. This, I believe, is sheer folly.

I referred earlier to changes in school organization which would be taking place in the immediate future, but, as Lloyd Trump, Associate Secretary of the National Association of Secondary School Principals' in the United States, points out, real change will take place only if programs differ, and he suggests that an educational innovation is effective to the degree that it furthers three fundamental educational goals - individualizing learning, professionalizing teaching, refining content. I agree that much must happen in these three areas.

One method of individualizing instruction, which Trump highly recommends, is the implementation of independent study. It is described as what a student

does when teachers stop talking. A student may spend a good deal of time in the library, in science laboratories, or other work rooms searching for knowledge, analysing data, reflecting upon the ideas which he is encountering and putting his conclusions into writing. He will not only be progressing at his own pace, but he will be engaged in those types of activities which he will use after he leaves school. Possibly no aspect of the program is so potentially beneficial nor so fraught with inherent weaknesses. If twenty five percent of a student's time is devoted to independent study, he may learn to exercise initiative, to develop independence of action, to progress in accordance with his ability, and to develop skills essential to future growth, or he may merely loaf, waste his time, and obtain 25% less education than he might otherwise have gained. Students and staff must, therefore, plan, structure, implement contracts, and thus assure that the goals and purposes intended are actually being achieved.

Much has been written about the importance of critical thinking and of problem solving as desirable educational objectives; perhaps too little serious thought, however, has been given, in the past, to implementing these in the classroom. Capable, professional teachers will introduce learning opportunities in the future so that students will gain more experience in these challenging activities. Research indicates that three variables are directly related to the level of a student's thinking in any classroom situation. These are the degree of student activity and involvement, the number of problem-solving situations experienced, and the kind of questions asked by the teacher during the discussion. In the future, there will be much less emphasis on lecturing and superficial questioning and answering. Someone once remarked that these methods serve only to get material from the teacher's notebook to a student's notebook without touching his mind.

I would like to emphasize that, in planning our educational programs, teachers must not lose sight of the importance of intellectual development; they must not keep students merely happy and entertained. When I speak of intellectual development, I refer to the importance of inquiry, of discovery, of thinking, of reason, of creativity and of the development of useful skills. These activities should help students to see relationships between facts. Through inquiry and discovery, evidence is internalized and organized by the discoverer in such a way as to produce insights conceived by himself. If this type of education is really in evidence, then schools will not be criticized, as Cowper criticized them when he wrote,

"The schools became a scene
of solemn farce, where Ignorance on stilts,
His cap well-lin'd with knowledge not his own,
With parrot-tongue performed the scholar's part,
Proceeding soon a graduated dunce."

The separation of the school from the world of work and from the world of community services results in unfortunate consequences. Many students see the school as apart from the adult world in which they will be living. This often results in low interest and effort in their studies. I believe that what is needed is the development of bridges to the rest of the community and a greater openness in the school to outside persons and activities. Students then will assist in solving real problems, such as, pollution, traffic, housing, crime, drugs, the disadvantaged, and the senior citizens. In the solution of these problems many disciplines will be used. This inter-disciplinary approach to problem-solving is essential to learning and will, I believe, become much more widely used. It does not follow, however, that there is not also a place for structured and sequential learning. Let us not fall into the trap that the introduction of one means the elimination of the other.

One of the goals of education is to produce flexible, intellectually challenged people. Each year the school program should open new doors and develop new abilities to enable the student to go through these doors as he chooses. I am confident that the education of the 70's will accomplish this more effectively than it has done hitherto.

The development of personal and social values.

I have referred to the importance of intellectual development and of meeting the needs and interests of the student. Education in the 70's must give greater attention, I believe, to the development of personal and social values. Man has been rocketed into space; he has created the computer that remembers, files, sorts and answers, in a moment, problems which would tax 100 men for 1000 days, but he still cheats, steals and kills as he did 1000 years ago. Our immoral men are the most educated of all time. Wordsworth, in 1807, said what many are saying today that, "The world is too much with us; late and soon, getting and spending, we lay waste our powers".

Knowledge, facts and skills are important, but as Edmund Waller reminded us, "For though with judgment we on things reflect, our will determines, not our intellect". Many school programs can perhaps be delayed and given at a later date, but attitudes cannot. The attitude that a student develops now will irrevocably shape the kind of person he will become. We cannot postpone the nurture of important attitudes.

Students must learn to recognize the relationship between freedom and responsibility. Everywhere today we hear people talking about rights and freedoms, but there is little reference to responsibility. Freedom can be enjoyed only if it is earned, and it is earned through the acceptance of

responsibility. Thomas Payne reminded us of this when he said, "Those who expect to reap the blessings of freedom must like men undergo the fatigue of supporting it." The old saying that the fleas come with the dog applies particularly to the relationship between freedoms and responsibility. Perhaps we've given our young people too much freedom without asking enough of them. Those who have privileges without responsibilities are parasites, and those who have responsibilities without privileges are slaves, and a democracy has no room for slaves or parasites. Schools, I believe, can play an important role in the development of this understanding.

The true worth of civilization is found in its values, in its beliefs, in its feelings, in its preferences, in its aesthetic judgments and in its standards. These are frequently expressed through music, art, literature, history and other disciplines. The school has an important role to play, because the benefits depend to a large extent upon the objectives and the philosophy of the teacher. In physical education, for example, the student may learn sportsmanship, fair play, respect for others, the importance of team effort, the value of physical well-being, personal and group loyalty, and a whole galaxy of traits that affect his character and determine, in no small degree, his ethical and moral standards. Or, he may also learn to be mean, brutal, discourteous, unfair and to acquire a host of qualities which will adversely influence his personality development.

Young people sing, "I've Got To Be Me", and this is interpreted as giving each individual the right to do what he wishes. And yet deep down we know that the solution to many of our problems requires self-discipline and the subordination of personal interest to the public interest. Inherent also in self-discipline is a respect for law and order. Many centuries of human misery show that once a society departs from the rule of the law, and every man becomes the judge of which laws he will obey, only the strongest remain free. Wherever law ends, tyranny begins. The problem with mass action is that it relies not on government by consent, but government by the crowd. It encourages not government by persuasion, but government by pressure. Decisions are not made by reason but by riot. These are understandings and attitudes which our young people can appreciate, and which, I believe, have received too little attention. If our society is to survive, all of us must consider seriously the values, beliefs and truths by which we live.

Pre-school and post school education.

I should like to comment briefly on two other aspects of education which I believe will receive much greater emphasis in the 70's than they have previously, namely, pre-school and adult education.

A study in a Pennsylvania city revealed that, if a first-grader came from a home where the father was not working and there was no telephone, the chances were 8 out of 10 that he would become a dropout. Another study revealed that children, who were not achieving academically at the end of the first grade, and who had to repeat either the first or second grade, had only a 20% probability of completing high school. It would appear that students such as these were virtually condemned to failure at age 6.

Benjamin Bloom, in his book "Stability and Change in Human Characteristics", points out that a child attains 40% of all the intelligence he will ever have by the age of 4, and another 40% by age 8.

Dr. William Fowler has conducted studies to reveal the ability of infants to learn. He points out that infants must have diversity or else they will be placid and conforming; they will lack initiative and ideas for play activities and school learning. There is evidence, he says, that no man of high ability has ever grown up without some kind of guided stimulation.

In the light of this and similar information, I am confident that greater emphasis will be given to the development of the young child in the decade ahead. Consideration will have to be given as to whether this takes place through parent education, through child care centres, or through public education programs.

Adult Education will also take on much greater significance. Someone once remarked that education is too important to be wasted on the young. This rather startling statement is intended, no doubt, to point out the necessity for providing education to mature individuals. People today are well aware I believe, that education is an ongoing process. Margaret Mead expresses it dramatically in the Harvard Business Review when she says, "No child will grow up in the world in which he was born, work in the world for which he was educated, or die in the world in which he worked". Education must not only be universal, but life-long; adult re-education is no longer a luxury but a fundamental necessity for economic survival. There are students in our secondary schools who for many reasons such as, lack of maturity, motivation, and effort find the school program irrelevant and boring. A dynamic adult education program for these people, at a later date, may be much more effective and desirable.

The school staff.

I have been talking about changes in education and some of the changes which will receive particular emphasis in the 70's. J.C. Ricker, a professor at the Ontario College of Education, makes an observation which we should not overlook, "Change is not a kind of educational wonder drug.

Few of the recent changes strike at the heart of the problem, that is, the quality of instruction and the quality of the teachers. New buildings, techniques, materials, communicative aids and so on, solve very little by themselves. We have all seen impressive displays carried on in an atmosphere of frantic freedom in aid of nothing at all. Good teachers are imaginative, creative and practical people, and good teachers in the future will be very much like good teachers of the past."

J.H. Stevens, also a professor at the Ontario College of Education, emphasizes the importance of the teacher when he says, "Students want teachers who are interesting, vital, creative people, who can laugh when laughing is appropriate, listen sympathetically, express their own views with conviction, and challenge students with questions that spring from the authority of study and thought. The over-directive and garrulous teacher has always been deadly poison to students and colleagues alike, but over-emphasizing the merely consultative function of teaching can become pretty silly, too."

I am sure that few people would underestimate the importance of the teacher in the educational process. Tennyson, in 'Ulysses', said, "I am a part of all that I have met." A capable teacher arranges experiences so that a student meets a great variety of them. The language a student speaks, the customs he accepts, and the values he cherishes are all derived from his experiences.

I hope and expect that, in the future, elementary school teachers will have more academic training and secondary school teachers more professional training than they had in the 60's. I hope that both will be imbued by the tremendous responsibility and opportunity which is theirs and will be able to devote more time to professional duties.

In effecting this a school staff will comprise, I believe, professional teachers and teacher-aides with proportionally fewer teachers and more aides. Perhaps all professional persons carry on housekeeping duties and these may be necessary for performance, but they are not critical, and many of them can be done by technicians. A teacher is a professional person because he can solve problems dealing with instruction better than anyone who is not a teacher. The professional teacher should have a knowledge of his subject field, an ability to inspire and to motivate students, an ability to program instruction and to maximize student achievement, an ability to diagnose instructional shortcomings, and prescribe remedies, and an ability to think, act and work like a professional person. It is essential educationally and economically that professional teachers and teacher-aides work co-operatively in planning an effective school program.

I do not intend to suggest at this conference on School Design that the school program depends largely on the quality and characteristics of the Physical Plant. It should, however, be obvious to all that the design of schools has a significant influence on education. Because of the flexibility of programs the available space should be quite flexible. There should be areas for large groups and areas where small groups may discuss information and community problems.

Numerous spaces should be provided for independent study. Resource centres should be large, well equipped and readily accessible. Audio-visual materials should be provided in abundance and should be available easily and quickly. Interest centres, where inquiry and discovery may be carried on, should be provided and should be changed frequently. Areas of study, both academic and shops, should be grouped carefully so that an inter-disciplinary approach may be feasible and so that various groups can co-operate in the completion of complex projects. Outdoor education facilities suitable for various age levels, should be available. At least some buildings should be air-conditioned in order to carry on an effective summer school program.

It would be unrealistic to suggest that all schools can have these facilities at an early date. Perhaps the most urgent type of study that could be carried on at this time would be to examine present buildings with a view to suggesting ways in which many of these changes can be effected at a minimum of cost. I am convinced that new thinking is more essential than large amounts of additional money in effecting many desirable improvements.

In speaking to you today, I have not mentioned the greater use of buildings through the extension of the school day, nor changes in the method of financing. These are very significant problems, and will undoubtedly affect the outlook for education in the 70's. I have selected a number of aspects of education which will be the concern of our schools in the next decade and as I have pointed out, some of these are closely aligned to school design which will be discussed at this conference for the next two days.

I reiterate that I have not attempted to emphasize the sensational, nor to engage in airy speculation. Certainly there may be dramatic changes in the years ahead but, like a golfer, an educator plays the ball where it lies. Education in this province, in spite of the views of the cynics, has served the public well. As I have pointed out, it will move forward rapidly in the years ahead, building, I hope, on the sound foundations of the past.

A dairy firm used a slogan, "We sell milk from contented cows". I believe that the schools of this province have the philosophy of the competitor who said, "Our cows are not contented; they are always striving to do better."

SUMMARY OF REMARKS MADE ALONG WITH A SLIDE PRESENTATION by P.F. Wiseman

Group Meeting - Open Plan Schools

1. A significant trend affecting a school organization and Program Development in general today is simply "a change of attitudes" towards the education of children - not only how kids learn but also the environment in which they learn best.
2. In a sense, this change in attitudes can be characterized by one word - "OPENNESS" - towards individuals, experiences, resources, and facilities.
3. In the few minutes I have for preliminary comments, I'd like to focus on this idea of openness - to express some ideas and concerns in an attempt to develop a kind of rationale - in educational terms - for open plan schools.
4. Whitehead: - "Students are alive, and the purpose of education is to stimulate and guide their self development." Tremendous strides are being made today towards a child-centred and activity-centred program - one that emphasizes quality of education in terms of the development and capacity of each child.
5. Education is the 60's focused on the child and, in addition to the development of skills in the traditional three R's four additional ones emerged:
 - (a) RESPECT:
 - The development of both self respect and respect for others is encouraged through a wide variety of activities planned with and guided by the teacher. The key word is "planning".
 - (b) REALITY:
 - Rousseau - "Experience precedes instruction" - Learning is more meaningful, more lasting, and more interesting when children are given time to experience things for themselves. An activity-centred curriculum involves children in many real or first hand experiences as well as the second hand experiences we have been accustomed to.

(c) RESPONSIBILITY:

- An activity-centred program offers children more freedom to interact with others. However, it must be freedom with responsibility. It cannot be misinterpreted as activity for activity sake but rather carefully planned experiences that provide children with more time and opportunities to develop the power to think and reason for themselves.

(d) RESOURCES:

- A child-centred program requires utilization of a wider variety of Resources such as:

- (a) the teacher
- (b) other children
- (c) material - to permit freedom of expression in communicating what children have found
- (d) books
- (e) other media
- (f) community resources

6. Changes in school design help to facilitate the various aspects of a child-centred curriculum. Accommodation must provide a resource that is rich and accessible. However, since the emphasis must be on the child and the environment in which he learns best, constant communication between the educator and the architect is imperative.

Most important is the realization that the success or failure of any educational program or facility depends entirely on the attitudes and perceptions of those involved. Successful implementation of a program in an open plan school depends on:

- (a) the degree of commitment or involvement of the staff
- (b) the amount of preplanning and preparation in formulating the program objectives, and finally
- (c) an opportunity to communicate the program plans to the architect so that he can translate them into design specifications.
(Time for architects to visit schools, to see kids at work, and to talk to teachers.)

SCRIPT FOR SLIDE PRESENTATION ON OPEN PLAN SCHOOLS

by R. D. Schoales

"Children On A New Frontier"

1. This program is about London's Open Plan Schools.

Let us start by examining how open plan schools began in London's Public School System. This new design in school construction is a result of changes which were occurring in our more traditional schools.

2. New emphasis was being placed upon providing learning situations which developed the child's ability to think. New importance was attached to helping the child find some purposeful aims for his own guidance. More opportunities were sought to help the child develop a socially responsible set of values. Many forward-looking educators saw that aims like these could be more easily facilitated in a school building of a different design.

3. As Architect for London's Board of Education we met with educators to discuss the shape such a building should take to meet the new emphasis in education. This shape, of necessity, would also have to provide for future innovations. The Plan which you now see is the result of such planning.

4. The first open plan school in London, Sir George Etienne Cartier was opened in September of 1967. 5. The school is composed of two large, open, carpeted quadrangles with acoustic ceilings, each quadrangle being approximately equal in area to five classrooms or four classrooms and corridor of conventional plan. The resource centre is basically a traditional library. The most striking feature in the design of the new school is the absence of permanent interior walls.

6. The new St. George's School was built on a limited site to replace the original structure. It is a three-storey school with each floor containing two quadrangles similar to those of Cartier. Folding walls may be used to divide the quadrangles into two equal areas. Conference rooms to facilitate teacher-team planning were incorporated into the design.

During 1968 a committee of teachers, principals and administrators was formed to recommend modifications that might be considered in the design of future open plan schools. In June of 1969 7. Sir Isaac Brock and Arthur Stringer Public Schools, each built around an open resource

centre, were added to the increasing number of open plan schools.

Three or four quadrangles are located around the perimeter of the resource centre which is equal in size to two and one-half classrooms. The construction of W. Sherwood Fox, 8. Lord Elgin, and Stoneybrook Public Schools marks the continuing growth of open plan schools in London, with two more on the drawing boards.

It should be noted that a committee on open plan schools meets once a month. This committee which is composed of assistant superintendents, principals, and consultants of the seven open plan schools convenes to share plans, ideas and programs. In addition, the meetings provide an opportunity to discuss common problems.

9. Let us now look at the open plan school in action. You see before you a pleasant yet stimulating atmosphere for learning. The large open area provides for flexible seating arrangements with chairs and trapezoidal tables thus allowing room for a variety of activities. While the teacher works with a group in one corner of the room, other children in small groups, or individually might carry on activity ranging from typing their own creative writing to dramatizing their own puppet show.

10. In each school there is one quad having folding walls. These quads can be completely open or converted in a few moments into four separate classrooms. This capability makes these quads truly flexible.

11. The flexibility of space in the open plan schools provides for a variety of group sizes. With the movement of a few pieces of furniture, sufficient space is made available to permit one teacher to instruct a large group of pupils. This situation makes for increased use of teacher talent as seen in this music class. The other teachers might be engaged in co-operative planning or could work with either individual or small groups of children.

12. Teachers frequently meet with pupils in small group situations.

These groups might be organized to pursue special interests, to provide enrichment activities or to give remedial aid to those requiring additional help.

13. While some teachers are instructing large groups of children, other teachers are free to give individualized aid. All these activities are carried on in one classroom.

14. Because of the environment in the open plan school, teacher team planning is essential to co-ordinate the activities of a quad. These meetings take place in teaching planning work areas adjacent to each quad. Each work area is equipped with desks, book shelves,

filling cabinets and cupboards. Much of the planning takes place after school hours.

15. The Resource Centre is the heart of the open plan school and provides a setting in which pupils might search with increasing independence for an understanding of today's world.

16. The teacher-librarian teaches formal lessons to further the children's interest in books and also instructs on the use of the other materials in the resource centre. Much of her time is spent assisting children 17. in group of individual projects. Such projects permit the child to investigate topics of personal interest. The Resource Centre is a beehive of activity throughout the school day and after school hours. 18. It is common to see some children attentively absorbed at a listening centre, others operating a cassette tape recorder, while yet others view a film strip in a study carrel. The non-print material is becoming an increasingly popular method of research for many children.

19. The open plan school makes it possible for the child to become involved in a variety of stimulating and challenging situations. The child has opportunities to acquire the basic skills which still are the foundation of the program in the open plan schools. He still furthers his knowledge in the traditional subject areas although the material might be assimilated and presented in a variety of ways. Not all information is presented by the teacher. 20. At the completion of a project, pupils might share their knowledge with small groups of other interested pupils, or with the entire class. Enthusiastic and even heated discussions can follow such a presentation with all pupils benefiting.

21. Children work co-operatively to solve problems. These boys from the primary quad are learning about mathematics through actual experience. It is not only an experience in mathematics, but also an experience in working and living together. 22. Some independent inquiry cuts across traditional subject lines. There is a natural blending of mathematics and science as these boys attempt to comprehend some of the mysteries of the pendulum.

23. Finally, it is apparent to those of us working in the open plan schools that innovations such as those you have viewed are to the advantage of the child if they are founded on sound educational premises and developed in view of what they might add to the effectiveness of existing programs. Future change must continue to be careful, deliberate and flexible.

The open plan school seems to say to the child, "Welcome Come in. Do some learning. Do some exploring. Do some living."

THE SCHOOL MEDIA CENTRE

by D.G. Bagshaw

Today's education places increasing emphasis on self directed learning. If the student is to identify a topic for worthwhile study and to investigate an appropriate line of enquiry, he will require access to a wide range of learning resources.

The resources to implement his study will not always be immediately at hand in the classroom or other learning area in the school. Increasingly the student is locating the learning materials he needs to fulfill his design through the services of the school library resources centre.

In response to changing patterns in education, the role of the school library resources centre has changed. The traditional library with its collection of book and other print materials has been transformed into a multi-media complex with facilities for creating learning resources as well as for using them.

Among the names currently in use, the term media centre seems particularly apt for an area providing the means through which learning takes place.

MEDIA CENTRE

Function

The media centre (or the library resources centre) is a multi-media complex which provides facilities for making available the following educational services to the school community:

- The selection, acquisition and production of a wide range of learning materials to support, enrich and implement the educational programs of the school.
- The organization of these materials so that they are instantly accessible to students and teachers.
- The provision of space for the most convenient utilization of these materials by large or small groups of students as well as by individuals.

Location

The location of the media centre is determined by its function. It must be so located that it can fulfill its function effectively by providing an appropriate environment that will be accessible to the school community at all times.

Provision should be made for future expansion of the media centre into adjoining spaces should this be required by an increase in student enrolment or by changes in the educational program of the school.

Facilities

The areas suggested are characteristic of a senior public school with an enrolment of 900 students.

The use of demountable walls is recommended wherever this is practicable for such areas as seminar rooms, offices and workrooms to facilitate future internal rearrangements of the media centre layout.

Space should be provided for the following media centre activities

- Selection, acquisition and production of materials
 - Audiovisual production area
500 square feet
 - Dark room
100 square feet
 - Librarian's office
150 square feet
 - Workroom
400 square feet
- Organization, storage and circulation of materials
 - Stacks for print and non-print materials (20,000 items)
1,200 square feet
 - Periodical shelving
150 square feet
 - Vertical file housing
150 square feet
 - Card catalogue
100 square feet
 - Charging desk
150 square feet

- Utilization of materials

- Independent study carrels
25 square feet per person
- Table seating
20 square feet per person
- Seminar rooms
15 square feet per person
- Soft seats (browsing)
20 square feet per person
- Professional library for teachers
25 square feet per person
- 60 persons
1,500 square feet
40 persons
800 square feet
60 persons
900 square feet
20 persons
400 square feet
6 persons
150 square feet

Special consideration should be given to

- Climate control
- Acoustical treatment of floors and ceilings
- Providing ample electrical capacity for the use of audiovisual equipment
- Ventilation requirements of the audiovisual production area
- Making the library accessible to the school community when the school is closed by the arrangement of entrances and the location of washrooms.

THE LEARNING MATERIALS CENTRE

by J. Bobaljik

Presented in the following manner:

1. The Learning Materials Centre within the Context of Modern Day School Thinking:

- a) History and Trends
- b) The function of the L.M.C. relative to school programming.

2. Physical Requirements of the L.M.C.

- a) Prime Space
- b) Secondary Space or Spaces

3. Summation

1. CONTEXT - How it came about and why:

- a) History and Trends:

(i) My own experience at elementary level not too many years ago (or so I like to think) I was in what we might call an "open concept" school - it consisted of a one room bungalow with a pot bellied stove that the senior students were obliged to pour coal into at intervals - taking turns. We had several grades within the one room (I think 3) but of significance here perhaps is the resource centre, or library consisting of one bookshelf in the corner of the room and several maps.

(ii) I later graduated to more modern educational thought to find that a whole room (the size of a classroom) had been wholly given over to the collection of books - we called this a library - or sometimes a library classroom - where we battled with the Dewey Decimal system and learned to walk on tip toes.

(iii) More recently, with the advent of the profusion of multi-media learning methods, the discovery approach to learning, etc. we find the library being replaced by the Library Resource Centre. - in some instances not much different from the libraries they replaced aside perhaps from being somewhat larger and containing audio-visual as well as the visual materials.

(iv) The trend appears to be toward integration of classroom and Library Resource Centre - and I would suggest that the word "classroom" in today's idiom will disappear as has the word "library" and we may

look to a total learning environment - a portion of which will be designated as Learning Materials Centre. Along with this I would further suggest a partial de-centralization of the Learning Materials Centre and would look to satellite L.M.C.'s or several mini L.M.C.'s near and about certain specialized learning spaces such as Science Rooms, Home Economics Rooms and Industrial Arts Rooms and Music Rooms segregated from the learning arena by virtue of their contribution to smell and sound pollution of the air.

b) Function of L.M.C., Relative to School Program

Regardless whether the school physically is the traditional series of boxes within one large box or the more contemporary type with little or no interior walls, the underlying principles embodied by today's learning methods require space for collection, research and distribution of audio-visual learning aids.

We seem to be caught with a multitude of catch phrases connected with the rapidly changing learning environment:

Phrases such as "open concept"
Discovery approach to learning
Ungraded systems
Phasing of students
Appropriate placement
Flexibility (whatever that means)
Team Teaching
Individual timetabling
Seminar teaching
and I'm sure you can add many more to the list.

WHATEVER the nomenclature, it would appear that the emphasis now rightly placed on the individual's learning. The student is now taught what we might call "communication skills" at a relatively early age - reading, writing, listening and speaking. He is then given (hopefully) the incentive to search for knowledge - whether it be self motivated - stimulated by schoolmates or guided by teacher.

Along with developing communication skills and a desire for expanding his knowledge the student must develop research skills - and it is in this context that the learning materials centre takes its place within the framework of the school program.

2. PHYSICAL REQUIREMENTS OF THE LEARNING MATERIALS CENTRE

a) The Prime or General Space:

- (i) It should be centrally located in the building, readily accessible

by and available to students, teachers and assistants.

- (ii) Space must be provided for the functional storage, research and distribution of visual, audio and audio-visual learning materials such as:

books	slides
pamphlets	film loops
magazines	transparencies
periodicals	radios
pictures	records
charts	tapes
filmstrips	headsets
	etc.

Photocopying and microfilming operations may take place here and it will probably not be too long before central computerized data retrieval systems terminals will also be common place in the media centre.

- (iii) Physical facilities to house, display and distribute the above materials and equipment are required - items such as shelving, carrels tables, electrical outlets and raceway systems - all adjustable, versatile, moveable and changeable as economically feasible.

- (iv) Size of the space and its shape should be suitable to the purpose - it is generally recommended to build slightly larger in anticipation of increasing enrolment. At any rate it is prudent to plan such that physical future expansion is not precluded.

- (v) It should be a pleasing space -- with little or no discomfort to the senses of sight, touch, smell, or sound. Heating, of course, but thought should be given to some degree of cooling as well particularly in our area.

- Ventilation is an absolute necessity - as are acoustical considerations - treatment of floor (carpet) and ceiling (acoustic tile) and possible drapery is usually sufficient.

- Proper level of artificial lighting of great importance.

- With properly designed artificial light, natural light for the sake of permitting light to enter the area is superfluous.

- Sometimes undesirable. However, studies have shown that extended periods of occupancy of interior areas completely devoid of visual contact with the outdoors can have detrimental effects on some people - significant

in number to require at least a small window or two for psychological reasons.

- Glare factors of working surfaces.
- Comfortable seating facilities
- Tackboards and shelves for creative and decorative displays - pleasing to the eye.

(vi) The space should be such that it may accommodate large groups, small groups and individuals in varying ways in their search for knowledge.

b) Secondary Spaces:

(i) Work Area:

- accessible by teacher and possibly some students.
 - work counter, adjustable storage facilities, typing desk, sink, electrical outlets.
 - used for some cataloguing of books, preparation of learning materials, simple repairs to books and equipment, picture mounting
- typing
recording
duplication of tapes
some temporary storage.

(ii) Storage Facilities:

Notwithstanding the present theories of "put the things out where they will be using them or else they won't be used", there are still requirements for storage of materials within storage spaces - and the need for these spaces should be assessed in conjunction with the anticipated school programming.

(iii) Small Group Activities:

- A number of small rooms expandable into larger spaces for the sole purpose of providing spaces for small group projects, discussions or whatever. The sizing of these relative to each other is quite important e.g. of little value to have two small rooms divisible by a folding partition such that when the partition is opened, the room approximates the size of a third room.

- A mini-theatre (for want of a better expression) - a room about half that of a standard classroom, acoustically treated, with a conversation pit, some sort of a stage - where the children can put on a play, hold story telling sessions or just "do their own thing".

- Here in the Sun Parlour we might try to take advantage of what pleasant weather we have and look to outdoor sheltered reading and sculpture courts or areas near the Material Centres.

Summation:

Basic understanding of the multi-functions of the learning environment is an absolute requirement for the designer of a school facility. However, it is my conviction that the architecture is subservient to the program - providing correct and suitable spaces for these functions and hence it is imperative that the administrators work closely with the architect especially in the very early design stages so that the end product enhances the success of the program.

In sum I would like to say that these are very exciting times, to be a part of the development of learning environments.

SCHOOL SITE AS A TEACHING AREA
by R. B. Johnson

Outside the Walls
(The School Environment)

Very often the school planning process starts only after a site has been selected; very often the school planning process is focused almost exclusively on classrooms, offices, laboratories, gymnasiums, or teachers' lounges. We're missing great opportunities to make the greater part of most sites which are not covered by buildings work for us.

The purpose of this discussion is to look at potentials for better utilization of school sites - outside the walls, and to look for opportunities of making the best use of sites we should have an idea of the goals we hope to attain. Three general goals are apparent and while they are interrelated it may be useful to look at them separately and try to assess potentials for each.

1. To increase mutual benefits for school and community (give and take with the community).
2. To increase opportunities for learning experiences (imagination outside the walls).
3. To make the most efficient and economical use of the site.

What are the potentials for satisfying the first goal, that of improving the school as a community resource facility and benefiting directly in the bargain?

Although there were many seemingly unsurmountable obstacles to a marriage of sorts between the school and park, this concept is now accepted as advantageous and desirable, and is being undertaken in many areas. Stephen Leacock Educational Complex in Scarborough, Ontario is one example where school and park have combined to mutual advantage. The project, still under construction is on 35 acres and includes junior public, senior public and high school with a ten acre park. Advantages of this particular project are shared recreational facilities, parking, site services and economies gained through more intensive use of land areas.

But what of other such associations? Coordinated developments with other institutions such as churches, community centres, libraries, concert hall, museum, YMCA, offer intriguing possibilities for expanding and improving these community resources and at the same time reducing costs through the use of shared space, facilities and services.

The requirements for parking alone in secondary schools is increasing demands on school site areas. Many community facilities require parking during times when school parking is not in great demand. Why not get together? A wide range of possibilities could be discussed, many of which are "inside the walls", therefore outside the particular scope of this discussion. One of the keys is to develop cooperative attitudes among the various agencies and authorities involved whereby joint planning and development of facilities can be considered. I would even suggest, at the risk of establishing yet another agency, that joint or pooled budgets for community institutional, facilities and programs be controlled by a coordinating agency representing the various institutions.

Even the commercial sector of the community should be seriously examined for potential "partnership" possibilities - the shopping centre is in many areas the real heart of newer communities. The school, to perform one of its roles as community centre should perhaps seek ways to develop closer ties with this part of the community. The shopping centre is notorious in many areas as a teenager's hangout, perhaps it is because there is an attraction there. The school might benefit from a thoughtfully considered association wherein the "school" includes the bookstore, ice cream parlour and malt shop - even the bowling alley and pool hall. Perhaps the school (proper) might even become the hangout.

In summary, schoolboards should perhaps seek ways to involve the school on a site together with other elements of the community in a campus like development. The benefits to be derived are obvious:

1. Possible lower costs
2. The potential of developing a stronger community facility, where the whole is greater than the sum of its parts.

II. The second goal is to increase learning opportunities through better use of the site.

In our climate, even here in the banana belt, we cannot depend on extensive use of outdoor classrooms at least for regular classes. However, areas could easily and economically be provided for informal class meetings. There is great potential in learning activities involving direct participation, such as painting, sculpture, drama, horticulture, experiments in science classes such as those involving soil erosion, micro-climate controls etc.

These kinds of activities do not necessarily require special facilities, although storage for equipment could be advantageous. An amphitheatre for drama, speech or lectures can be useful and this can often be economically developed during the site grading process.

Young people find rewarding experience in creative activities where they can personally modify their environment. Some of the most successful playgrounds (successful in the children's eyes) provide opportunities for such involvement. The so called "junk playground" has been successful in several countries in the world. Here children "do their own thing", building with scrap materials collected or donated by contractors, service clubs and other agencies. Too often this kind of recreation is discouraged by recreation agencies because it does have the potential of creating a disturbing ripple in the manicured park scene.

The idea of young people, building, using a wide range of materials and with techniques limited only by their imagination, to create their very own houses, ships, sculptures or "things", can easily be realized if we want it to be. Facilities need be nothing more than a small area of the site, perhaps screened by earth berms or planting, plus scrap materials. Similar facilities of course could be most useful for practical teaching for some of the technical courses. Woodworking, welding, drafting courses could benefit from such opportunities to design and create. Such creations could benefit the community at large where for example older children could become involved in building play environments for younger children.

The site offers other potentials as well. Parking areas can be used during off peak times for driver training, gymkhanas, badminton, volleyball, hopscotch and so on.

There may be many other ways in which the site can offer potential for increasing the learning experience, the only real limitations are the willingness to experiment imaginatively and of course a little bit of land not covered by buildings.

III. The third goal, the economical and efficient selection, planning and development of the site is essential to the realization of any of the previously mentioned areas.

Before anything else the site must be selected. Obviously, the selection of a school site is determined to a great extent by budgets and what lands are available, but consideration has to be given to the relationship of the site to other land uses, such as those mentioned earlier, as well as open space, population densities, access and transportation. The neighbourhood principle in community planning is well known wherein each neighbourhood supports an elementary school where children are no further than a quarter of a mile from the school may walk to it without crossing major roads, and where the open space system is related to the school.

It is most important that the site is also physically suited to the school program. In other words every site has certain characteristics which make it more or less suited to particular uses. The ideal site is one which requires the least modification to adapt it to the program for development. To put it more concisely, site capabilities should relate to program demands. Therefore, the total site program demands should ideally be determined before the site is selected. While it is not always possible to select the perfect site, however if we are aware of the ideal situation we will be in a better position to make a choice when one is available.

Things to be considered include, topography, vegetation, soils, conditions, drainage, shape (very important) and of course land costs, access and availability of services.

Once the site is selected the planning of the site should be based on the overall program for the total site, taking advantage of all site characteristics and capabilities. Too often the school building is designed before real attention is given to the other demands for the use of the site. Parking area, sports fields and playgrounds are squeezed in, high ground is lowered, low areas raised and monies spent unnecessarily modifying the site.

The site planning process includes three basic aspects:

1. To determine the ideal relationship between use areas and facilities (including the school buildings) as well as access and circulation.
2. To apply this relationship diagram to the physical site, fitting it to take best advantage of topography, drainage patterns, existing vegetation, orientation to sun and wind and views.
3. Planning the modifications to the physical site to adapt it to the program for development. Ideally site and program should be well suited to each other in the beginning, so that the minimum modifications are required. Site grading is the major modification required for most sites and it is important that this aspect be carefully considered for site drainage and to create a useful three dimensional stage for the school program. The various use areas on a school site require differing topographic conditions, for drainage and for the particular function of the area. Softball diamonds, football fields, parking areas and playgrounds all have differing minimum requirements for grading. Nearly always the attempt in grading the site is to balance out and fill, so that neither excess or deficit results. Surplus materials are usually easier to handle than deficits and in many cases they are a distinct advantage. Earth forms using surplus material can be most useful in screening undesirable views of parking and service areas, to provide informal spectator space for sports activities,

to create wind buffers, to define spaces such as outdoor teaching areas or sports fields. Using the Stephen Leacock project again as an example, earth forms were designed extensively throughout the site for these very purposes, as well as providing a "learning to ski hill", a warning hill for the baseball outfield, and buffers to separate play areas for various age groups.

If the site is being developed as part of a complex with other uses then access and parking areas can be designed as shared facilities. But regardless of any affiliation, parking areas can be designed for dual use. Parking areas which are primarily intended for evening use such as those serving an auditorium, can serve other functions during the day. Examples include court games such as tennis, badminton, basketball, volleyball, hopscotch etc. as well as other activities like driver training.

Another example of a dual use facility is the tennis court-skating rink combination. Tennis courts are not normally provided in most schools, however they are often provided in parks. The park school complex at Stephen Leacock included an outdoor artificial ice rink with change facilities, which provide for three tennis courts during the summer.

The walls of school buildings can also be effective in serving more than the basic purpose of enclosing a classroom and could be used for handball, basketball, paddle tennis, and other games, as well as for outdoor blackboards, film screens, outdoor stage backdrops and so on.

The proper use of plant material on the school site is important. The best values in terms of capital costs, low maintenance costs, and benefits derived are gained through the use of trees and grass. Fussy ornamental plantings are expensive and often serve little purpose especially when viewed against the large scale of most school buildings. One hundred dollars spent on one shade tree can be much more effective in improving the environment than a similar amount spent on foundation plantings. Tree and shrub plantings in addition to being attractive in their own right can be effective in providing visual as well as wind and sound buffers, to soften large expanses of asphalt and of course to provide shade. Turf areas should be specified using grasses appropriate for sportsfields while others may be more suitable for general lawn areas and so on. Care should be taken in grading turf areas to avoid slopes that are too steep or have sharp changes in grade which make maintenance difficult.

In this brief discussion on school site development I have touched on various aspects each of which must be examined in detail as part of the site planning and development process. To summarize, consideration of the site must begin with the selection of suitable land, properly related to other land uses and where possible, integrated with appropriate community facilities.

The site should be physically suited to the program for school development and finally planned as a total coordinated development of buildings and site. Most importantly the school should be considered as more than a building, and more than a building on a site with parking, ball diamond and playground but as a key element in the community; as one of the parts that make the whole that is greater than its parts. Open the doors, tear down the fences and get with it.

SCHOOL SITE AS A TEACHING AREA by N. Massey

What has happened in the past few years that children, teachers and parents look on the surroundings of the school, or the site, as a place for teaching and a place for learning? You have the evidence in the recent 1969 legislation that schools may

"Provide during the school year or at other times, activities and programs on or off school premises, including field trips, and exercise jurisdiction over those persons participating therein."

It has happened that students leave the school building, and use the school site as a place for learning. Why?

I think there is one basic reason. Most of us came from schools where teachers transferred information and skills to us. Our ears were open to their ideas, our eyes were open to appropriate paragraphs and our minds were open to their system of values. We can remember a general trust in this education except for the unusual individual who might ask, "What good is trigonometry?" or "Why should I memorize these valencies?" For, if the teacher prescribed a course, if the textbook was limited to the prescribed course, if the school was equipped with books, apparatus and films for teaching the course, education could be most effective as an inside job.

Now we know that a teacher is a professional, an expert I mean, who knows how to encourage children to learn. Boys and girls no longer accept ideas; they grasp for them. Boys and girls choose where they will reach for ideas - and for some knowledge, they must leave the school. Susan Isaacs, the English educator put it this way: "The school is, in my view, simply a point of vantage for the child in his efforts to understand the real world." Schools, then are places to assemble, places to store books and other learning materials, places to leave for investigating the larger world, places to come back to, and places to elaborate one's experiences.

What kind of curriculum utilizes the school site? Perhaps the word "site" needs some clarification. The school site means "the ground on which a building stood, stands or will stand" according to the dictionary. To me, it means more. It means the fringe area close to the school too. For though the school has no control of this fringe area, it is the handiest resource.

The trees along the street, the traffic, the houses, the businesses and the people living there are part of the curriculum. Sometimes a cemetery, a shopping centre, or a park provides raw data.

The school grounds themselves can be a further resource. First, comes play. Flat asphalt doesn't make a play-place. But hills and trees, warm corners, wall-shaded benches, and concrete structures encourage creativity. "Quit working and get on with your play" is a sound rule. Older students too need meeting places, places for talk, places for drama and quiet places for reading.

Some schools have designed the grounds while retaining old houses with iron gates and old log-houses; and all of us remember Ryerson with its old entrance preserved, and the pillars at OAC in Guelph.

Since modern schooling works with themes, along with study of subjects, there is a much wider range of things to do outside the school.

Back in 1966, the late Max Parnall said: "Student commitment to the school program is the challenge of the Seventies." Have we a place for the enthusiasm and work of students in our site development? A student will never forget the wheelbarrows of earth he moved, the trees he planted, the concrete sidewalk he travelled, the masonry wall he built, the wooden platform he nailed together or the mural he painted. Ontario schools must become their schools.

In conclusion, how can we know when the outside of the school becomes a place for learning? When it becomes like our back yards, a place devoted to convenience, beauty and homeliness.

COMMENTS by Mrs. G. E. Lamb, Architect, London, Ontario

In the discussion following the extremely good presentation by the panel, the problems of the urban school where the density is such that play areas must be covered in asphalt were brought up. I would submit that we place far too much emphasis on "grass". If you turn children loose in a normal park, most of them will play on the paved areas. There have been very successful parks where there isn't a single blade of grass. I saw one in London, England, which was done completely in brick. It had a castle motif with swinging bridges, towers, etc. The problem is not the lack of grass, but the use of asphalt! There are a great variety of paving materials which can give interest and play opportunities in the surfacing of a play area. We need less asphalt and more imagination.

In reply to the comment on safety - i.e. skinned knees, etc. resulting from hard surfaces and towers: - The reason children fall is they haven't learned to climb! Left alone, they usually climb only as far as they are able.

It is when adults push that they over-extend themselves and are they apt to fall. Your comment that the same holds true for education was well taken.

The development of the Site by Mr. Johnson was very well presented. Architects in planning the schools can also contribute substantially to this development by creating, by means of planning, small spaces around and between buildings which can be dealt with on a more human scale. The ideal for most schools seems to be to site the building on one corner of the flattest, most barren land possible and to then divide the remaining land between parking areas and football fields. Important as these may be, that portion of the yard used during recess and before and after class has by far more learning potential for the child. (By this I do not mean swings and roundabouts!) This is an area which has been totally neglected to date.

GRANTS FOR SCHOOL BUILDINGS AND THE EFFECT ON DESIGN
by D. Russell

This subject upon which I am asked to give a talk should, in fact, be discussed over a drafting board. However, I will attempt in the time given to bring to your attention my thoughts on this matter.

Prior to 1967, certain boards were even then influenced in the design of a school by the amount of grant which would be forthcoming, while other boards completely ignored this item. Two recent significant Departmental Policies have had an effect on school design, i.e.:

- (a) The School Business Procedures Manual, issued in 1967
- (b) Cost control, effective December 9, 1968

a) School Business Procedures Manual

The introduction of this Manual in 1967, provided grant for each eligible space in a school proportionate to the size of such spaces. Again, certain boards were definitely influenced by the amount of grant available, while certain other boards went merrily on their way designing "gold-plated" institutions, obviously not in the least influenced by the amount of grant available and the total cost did not seem to worry them in the least.

A sad commentary upon this matter occurred many times when boards would submit to this office, several sketch plans and then ask what the grant would be for each scheme. If the poorest scheme would receive the largest grant, then that scheme was usually chosen. These boards were, in effect, playing a "game" and a sound scheme, based upon logical, educational needs, took second place to an unsound scheme which would produce a larger amount of grant.

Under the School Business Procedures Manual, the majority of boards received an approved expenditure of at least 85% of the total cost of a school. An "economical" design might receive a 90-95% approved expenditure while the "gold-plated" jobs would receive only a 70% approved expenditure of the total cost. While the School Business Procedures Manual did have an effect on school design, it did not work to the detriment of boards who honestly attempted to produce a good scheme and at the same time wished to receive the maximum approved cost available.

b) Cost Control

On December 8, 1968, I was personally instructed by the Deputy Minister that "gold-plated castles" would no longer be tolerated and a cost control

of schools must be instituted. Therefore, this office commenced comparing a board's total estimated cost with the Departmental approved cost. If a board's cost proved to be "excessive", the board was asked to meet with us to determine the reasons for the high cost. This office realized that, due to the rise in construction prices during 1968-1969, the School Business Procedures Manual was approximately two years behind times. Therefore, to fairly determine if an "excessive" cost existed, when comparing a board's cost versus the Departmental approved cost, this office added a percentage to update the manual and a further percentage to allow for flexibility in design. This percentage updated the School Business Procedures Manual. During the first few months of 1969, many boards were asked to attend at this office to explain excessive costs. If such excessive costs were not approved, the board was asked to re-design the school to come within the Departmental approved amount. Unusual cost (site conditions, earthquake) were taken into consideration. It must be observed that within the past two months, only four boards submitted plans showing an unapproved cost.

This cost control policy definitely had an influence on school design - but only to the benefit of boards (whose members are actually taxpayers). It must be noted that the total cost of a school is primarily due to educational decisions, e.g. some boards request individual areas only slightly above the Departmental minimum requirements while other boards insist on areas based upon the maximum shown in the Departmental tables or even greater areas.

I take this opportunity of bringing to your attention, items which may contribute to a board's estimated cost which is unacceptable to the Department:

(1) Area:

An excessive area, well above the Departmental theoretical area, may well contribute to "excessive" cost. This may be caused by large entrance areas, oversize teaching spaces, etc. It must be observed, however, that some boards are able to design 1000 sq. ft. over the Department's theoretical area and still come within the approved cost,

(2) Design:

A school design in which no wall runs more than 20 feet without a change in direction, is usually above the cost which the Department is willing to approve. A library, two floors in height, may well contribute to "excessive" cost;

(3) Mechanical and Electrical:

It is observed that boards having their own architectural staff, are able to produce a school at a lower cost than the majority of schools, one factor being that the mechanical and electrical costs are significantly lower than in average schools.

In conclusion, it may be stated that the School Business Procedures Manual and the Cost Control Policy does affect the design of schools, in that it attempts to do away with the extravagant use of spaces, frill, etc. For example, a scheme in which all exterior and interior walls are at various angles, the library is two floors in height and a portion of the second floor is cantilevered, would undoubtedly be above the cost ceiling as determined by the Department and would therefore be unacceptable.

Boards can, however, and do submit schools with individual eligible spaces of a reasonable size, good design and receive Departmental approval. "Open" plan schools or schools of unusual design are certainly not prohibited if such schools can be built within the Departmental cost formula.

During the past few weeks, requests for Departmental Final Approval have been received at this office indicating a lower trend in costs. Several of my architectural compatriots tell me this is due in some part to the General Contractor willing to take a lower profit.

GRANTS ON SCHOOL BUILDINGS AND THE EFFECT ON DESIGN by J.C. Couchman

The planning of every new school and school addition is governed by the school grant structure and the design is directly affected by the grant money available for each school project and the budget approved by the Ontario Municipal Board.

The design problem becomes an intricate and delicate interplay involving the selection of teaching and other grantable facilities, the physical sizes of the selected facilities and finally the relationship between these facilities and their non-grantable ancillary areas in order to obtain the maximum grant and both the Department of Education and Municipal Board approvals for the construction of each school project. This exercise requires a thorough knowledge of the school grants manual, its six published amendments and the many unpublished interpretations of the grant formulae that are constantly being changed in the School Plant Approvals office.

As many of you know there are several stages of approvals in which each stage outlines the grant money available and also the maximum limit that a school board may spend on each individual project. This maximum limit together with the area requirements of each grantable facility outlined in the grants manual will dictate to a large degree the ultimate design of the school. Of course there are other factors involving educational trends and building functions, construction materials, building techniques and the regulations of the Fire Marshal's Office, the Board of Health and the building codes that also affect design but the overriding factor is the grant structure.

New school projects are usually straight forward exercises in selecting the various facilities both grantable and non-grantable as requested by the educators, establishing the maximum grant and then designing the school to fit the budget limitations. The areas for each grantable facility are set by the grants manual so that the school design revolves around the relationship of the selected areas to obtain the best possible circulation, building function and flexibility, building durability to lessen maintenance problems and finally as pleasing an appearance as the budget will allow. As you all know building costs fluctuate in different parts of the province and can vary most dramatically even in the relatively small area of Southern Ontario. The actual construction costs in any area when compared with the fixed grants will have a marked impact on the design of the school. The usual complications for a new school project involve the site conditions which can add considerable cost to a project without compensation by the

grants manual and require special dispensation from the School Plant Approvals office.

School additions however, can be much more complicated and can involve simultaneously new work, alterations and in some cases renovations, each with its own special grant structure. A further complication of the normal exercise followed under an addition to an existing school project is the area fraction reduction of the calculated grant which reduces the budget available to complete the work and will again affect the ultimate design of the school.

The present procedure of approvals can and do cause considerable problems to school boards and architects when planning new projects especially work involving additions and alterations. In many cases the building proposal request form is completed by school administrative staffs and forwarded to the regional offices where, without the benefit of sketches it is held up, questioned and sometimes returned on minor technical points that could easily be resolved with a sketch plan of the work involved. The building proposal approval from the Department of Education in many cases is returned to school boards using areas and accommodation unit factors which establish a grant that radically changes with the sketch plan submission.

School boards technically must obtain municipal board initial approvals of projects before proceeding to sketches. The building proposal approval establishes budgets that could be unrealistic which then involves much correspondence and delays at a later date in explaining the inevitable changes in the project costs to the Ontario Municipal Board.

The area fraction reduction of the calculated grant applied on school additions discriminates against economical school design and could force school boards and architects to add unnecessary and unwanted non grantable areas just to meet the budget restrictions. For example when an economical design that incorporates all the teaching facilities is planned with less area than the minimum gross area according to the grant formulae, then the approved cost for grants is reduced forcing school boards and architects to add low cost unwanted area just to improve or eliminate the fraction or pray for a very low tender price to avoid exceeding the budget limitations and possible cancellation of the project.

Another problem that the grants manual does not cover very clearly is the work involving alterations. This work is grantable when the function of an existing room or area is changed or incorporated into new spaces.

However, there can be many alterations to a school which must be done to make the building function properly for which there is no grant. For example, an existing school that may have a straight classroom extension

without changing the function of an existing room would not receive any alteration grant. Yet much alteration work may have to be done, such as a new incoming electrical service to replace the existing, pumps and storage tanks to provide adequate water supply from an existing well, removal and replacement of ceilings to make connections to boiler rooms and electrical rooms, just to name a few. In some buildings this work can be quite extensive and expensive without the compensation of an alteration grant.

There is growing confusion between the Department of Education specialists, teachers and architects that is caused by the present grant structure. These specialists produce studies and issue pamphlets covering various phases of education including science, library resource centres, guidance, athletics and music to name a few. These studies recommend areas which teachers who have read these reports, request in new school projects. However, the architect is forced to maintain the area outlined in the manual and eliminate many of the requested auxiliary and ungrantable spaces recommended by the specialists in order to stay within the budget limitations. There appears to be little co-ordination between the specialists printed recommendations and the grant structure.

At the present time schools are being designed in three basic concepts. A "standard" model with each teaching space enclosed with four walls, a flexible model using moveable sound reduction partitions to open up two or more teaching areas and an open concept where large groups of teaching areas are combined without any walls. These three different models each with the same teaching facilities of identical areas can be built for three totally different construction costs and budgets yet the school grants for the three models are the same. The grant structure which in some respects is quite rigid on the availability of construction funds will dictate to some school boards that the cheapest of the three concepts must be built rather than have the decision made on the best educational policy.

In recent years the Department of Education's philosophy of education has changed much faster than the grants structure. Formerly twelve classroom elementary schools and 1600 student secondary schools were considered to be most desirable but now much larger schools are encouraged by the grant structure by allowing specialized facilities only for larger schools. As an example, smaller schools can only build library resource centres and athletic facilities to sizes in direct proportion to their student capacity, yet as these schools inevitably grow larger these same facilities become too small and with additions are altered to new uses and then new and larger facilities must be constructed. It appears to be a needless waste when ultimate size schools could be designed and built in stages even if oversized libraries and athletic facilities had to be built in the early stages of development. The present grant structure does not allow this procedure without a time limitation penalty for enlargement.

I think that the largest single complaints about the school grants structure that both the school boards and architects have in common is the lack of communication from the Department of Education when changes in interpretations and regulations of the grant formula are made without notification. Often school projects are rejected because of a new rule or regulation has been applied by the School Plant Approvals Office that can radically change the availability of grants and the project budget. The first indication of this change to the school board and the architect is a rejected approval in the return mail. Even a subtle change in interpretation can mean a complete redesign of a school project. Under present conditions it is vital that the Department of Education inform both school boards and architects immediately of any changes to the grant structure so that much time and energy can be saved and desperately needed school facilities can be completed on schedule.

USER'S REACTION TO CONTEMPORARY SCHOOL DESIGN

by D. Tighe (student)

Gymnasium:

- large, spacious, air well-circulated
- situated away from classes because of noise
- separate entrance, exit
- hardwood floor (better for sports)
- fold-out seats - gives larger seating capacity
 - gives gym more room when seats not in use
- scoreboards (electric)
- well-equipped
- adjoining showers and dressing rooms
- open after school and on weekends for at least the students
- stage (most gyms used as auditoriums) - have stage between gym and cafeteria so that it can be utilized in either area.

Cafeteria:

- large, bright, windows
- fold out seats - gives area other possible use during the day.

Environment:

- wide halls and stairways to avoid confusion
- water fountains recessed in walls and away from classrooms
- school painted bright colours and kept well-heated
- pipes and other such things placed out of the way
- lockers large and space in which they are located large enough to accommodate them.

Other Areas:

Music Area

- large for band
- separate areas for individual practice
- soundproof

Art Area

- open for free expression
- tables
- well-equipped

Darkroom

- readily adaptable for other uses (yearbook, newspaper, etc.)

USER'S REACTION TO CONTEMPORARY SCHOOL DESIGN

by P.J. Papineau

Our schools have some of the old familiar standards, they still have the individual steel desks, large wall of windows and blackboards to the front and side of the students, that we, who are older, remember.

The most notable change is the one-level structure in the outlying areas as well as in sections of the core city. This building has various advantages over the two and three floor structure. The intensity of noises is reduced, thus eliminating classroom disturbances. They are easily and more readily evacuated in case of fire or similar emergency because of the absence of congestion in the stairways and because of the numerous and handy exits. Our delivery men find deliveries are easier, safer and less tiring. The fact that delivery men do not have to perhaps haul a hundred or so desks up two or three flights of stairs certainly substantiates the above assertion.

The open concept classroom is also generally well received by our men. The fact that some walls are removable eliminates some of the cramped up cleaning you get at the base of these walls -- a total of four walls (in most cases) are eliminated.

A few years ago, it seemed inconceivable to believe that wall-to-wall rugs would be used in our school rooms. Today, this is a reality; and surprisingly enough, these rugs are posing no problem to our caretaking staff. They are cleaned with a Bissel Sweeper daily, vacuumed twice a week and shampooed during the vacations -- Christmas, Easter and Summer.

It has been said that the students tend to keep their class cleaner because they are more careful about spilling water or paints, etc. Perhaps this is a carry-over from home training where they are expected to be extra careful on the front room rug.

Our toilet and washroom walls are presently painted with plain epoxy paints. What is more tempting to a student with a pencil on the ear? The fact that the walls are plain grey, plain yellow, plain green or plain any colour makes it very tempting for our toilet-room poets to mark up. The result is a wall that must be erased with Spic and Span; and, before its time, the wall looks bad and has to be repainted. I would suggest a speckled Roxatone or ceramic finish to our toilet walls. These are less susceptible to the lead of the pencil or the ink of the Magic Marker.

All in all, I see many improvements in our schools and the fact that you people are willing to listen to us, the users, express our opinions about what you have built is an indication that you are not willing to sit on your laurels. Its encouraging to see that you will be improving our buildings even more. For this you must be commended.

CENTENNIAL SECONDARY SCHOOL

Centennial Secondary School was planned as a fully composite school to accommodate initially 1200 students with an economical future addition to provide for a 1800 - 2000 student school. The double loaded corridor plan of the academic wings provides a compact building, easily supervised, with efficient communication paths. By locating resource centre, auditorium, administration and cafeteria down the spine of the building, it has been possible to plan for isolation of those units which may function after school hours. The minimum exterior wall and corridor areas required by this type of plan is one of the factors that held the cost to approximately \$19.20 per square foot, including air conditioning of the whole building except gymnasium and high shops.

Features of the academic wings include grouping of accommodation by curriculum division - language, social science, mathematic and pure science, etc. In the middle of each group of subject rooms is a "Work Area" to accommodate the fifteen to thirty teachers involved, providing each teacher with files, cupboard space, paper work space, and use of limited duplicating equipment. The Business and Commercial Department includes a Secretarial Laboratory and an IBM 1130 teaching computer used by other secondary schools.

The auditorium seats approximately 670 (1/2 of the 1200 pupil school - 1/3 of the 1800 pupil school). The seats all have tablet arms, and will be used for large group tests, examinations, and quiet study purposes. Folding doors (gymnasium type) isolate the two wings to make lecture rooms, each seating 175. Equipment includes a "sophisticated" sound system and lighting system that will encourage the development of a curricular and extra-curricular Theatre Arts program. The stage has been designed to accommodate a 100 piece orchestra and dressing rooms are under it. In addition to serving the school, it is anticipated that the auditorium will be well used by the community.

The Resource Centre will house over 12,000 volumes, is provided with a "learning loop" audio system and with its four seminar rooms has seating for about 150 persons. There is a television distribution centre, and each teaching area is cabled for TV reception. Physical Education facilities include a "triple" gymnasium. In the technical area are seven shops well equipped for effective teaching. A special feature of the shops is four twin classrooms, each pair making available an area for a group of fifty when the dividing wall is opened.

Interior and exterior wall texture, colour, and design has been carefully planned to add an aesthetic value to the space enclosed for efficient function.

STATISTICS

Pupil Places	1390
Area, Building	156,190 square feet
General Contract	\$3,119,600
Equipment Budget	\$596,000
Area, Site	20.4 Acres

Shops - 7

Sheet Metal, Machine Shop, Electricity-Electronics, Carpentry and Millwork, Auto Shop, Architectural Drafting, Mechanical Drafting

Commercial Areas

2 Electric Typing Rooms, Secretarial Laboratory, Business Machines, Accounting, Marketing, Commercial Practice Office, Computer Complex

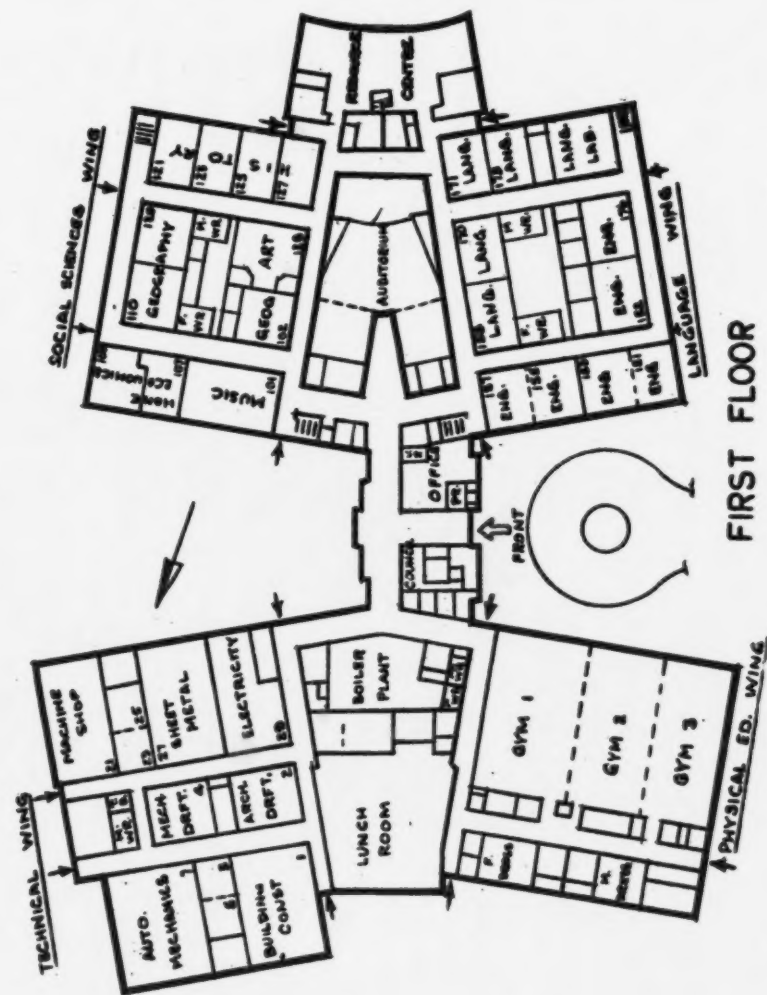
Academic Areas

19 Classrooms, 6 Laboratories, 3 Geography Rooms, 2 Lecture Rooms, 2 Home Economics Rooms, 1 Music Room, 1 Art Room, 5 Seminar Rooms

Special Areas

Resource Centre, Cafeteria, 3 Gymnasias, Guidance Centre, Health Unit, 5 Teacher Work Areas.

DOMINION BLVD.



FIRST FLOOR

NORTHWOOD ST.



SECOND FLOOR

EDUCATION TOMORROW by Dr. D. Cappon

The Setting

It is March, 2010 A.D. At last, a century, the 21st, belongs to Canada. And, Canada belongs to lots of other people; at least, large chunks of it does. The Bennett country West of the Rockies is part of the Eastern Consolidated States - a grouping of Far Eastern nations. Alberta has become the 55th State of the Union. The Maritimes have joined the Western Consolidated States, centred in N.W. Europe. Quebec has finally become free, under the educational jurisdiction of Gabon, and is part of a Francophonie Federation whose capital is Pondicherry. Yet, there is a sovereign state of Canada, independent, unpolluted, wealthy. Its granary is located in the two Western Prairie Provinces. Its backbone is Ontario. Its capital is Toronto, where the Queen spends six months of the year. But, its real power is in the North, where the world's major business is transacted midway between time zones in vast airline terminal centres; and where a world body, the Supra State Confederation also meets, at Polaria, a gigantic conference centre under a dome. The North is also the world's richest area in natural resources, the most advanced in technology and arctic architecture. Polaria is at the apex of the Mid-Canada Corridor, the haven of the world's most sophisticated industry.

Canada also boasts the world's oldest and most agile Prime Minister, a bachelor, nonagenarian who's just been dropped by helicopter on Whistler Mountain for a ski run in virgin powder. His name, Sir Pierre Elliot Trudeau, a man who has made many successful runs, out of Quebec, out of Newfoundland, out of British Columbia; a man who has conquered many a virgin... area; conceiving political innovations which resulted in Canada's ultimate glory; a man who has finally come to rest as the new Disraeli to an old Elizabeth. His greatest coup, however, was when he had appointed two Princes of communication, Lord Thompson and Marshall McLuhan, to form the world's most powerful media Dominion; for these gents had collected under them the major English language newspapers, along with the B.B.C. and Hollywood, all dominated by Canadians. When John Kenneth Galbraith delivered into their hands the American television networks, as these had slipped through Spiro Angew's fingers, these three Canadians formed a communication triumvirate, the G.M.T., which Sir Pierre has ruled ever since, with a Gallic shrug.

It was against this rich tapestry of Canadian cultural supremacy that a conference on Design in Education was called. Gabon was invited as a matter of courtesy, and also to give Canada some practice in bilingualism, which hadn't been used since M. Lévesque, the first Prime Minister of Quebec Libre, insisted on speaking English at the final place of confederation rupture, on the Plains of Abraham.

This meeting on Education was being held in Windsor, the centre of the Canadian universal multi-modal vehicular industry.

The world stood poised, waiting with baited breath, for all knew the Canadian capacity for educational revolutionary innovations.

The Revival Meeting

The first session of any conference nowadays, including this one on education, was always dedicated to the PAST and held under the aegis of the historical society. This was not because the past was held to be relevant to the present or to the future; the new millennium had long adopted the framework of "alternate futures" for any of its visions and plans and for any serious thinking, preparatory to decision-making. It was because reviving the past seemed a quaint, often nostalgic, dreamy and pleasant experience. In this case, the educationists were doing the whole bit, re-enacting the past with a psychedelic session, using once again the primitive drugs of their youth: pot, acid, hash. Everyone was high. And, what drugs didn't do, the rock music did, drowning out both the normal senses and good sense. How else were the conferees going to deal, in a mock session, with such a topic as Education and Architecture? As a wit remarked: It's like the Bishop said to the Actress, "Take it off, baby, and let's have a good look at you!" (That's all Bishops were allowed to do in those days, look!). But, the Actress kept on changing costumes. The new millennium had long since dealt in naked Education, unclothed in Architecture. A cradle-to-grave multi-sensory communication network, with special emphasis on new learning, was well-integrated in the very web of daily existence... as I shall elaborate presently.

Suffice it to state at this juncture that communication was so sophisticated in the year 2010 that it would have been quite impossible for anyone to have endured the embarrassment of a colleague of mine who had achieved quite a reputation based on his being an expert on sex.

The story of the mental scientist, lecturer on sex, who was going to speak about sailing and didn't (changed his mind back) without informing his wife about his mental reversal. Says she, "That's queer! He's only done it twice. The first time he was sick at his stomach, and the second time his hat blew off!"

At any rate, there were no more school buildings, no school houses, so the topic of Education and Architecture was antiquarian and could only be

sustained with old-fashioned psychedelic fireworks. To turn them on, the delegates were required to dress in funny costumes and be made up as yippies, hippies, beats and in other fashions of the lost decades. And, they had to carry banners and make speeches of protest. Some of the flavour of the latter part of the 20th century was indeed recaptured by such slogans as "Lower the age of Puberty!", "If God is dead, I want to speak to his Deputy"; and "I don't mean Mr. Benson, either." Or, "Tell me, Daddy, as an outsider, what do you think of the Human Race?"

The funniest things were the protestors against wars. At the conclusion of the first decade of this third new millennium, the world had celebrated the conclusion of the two thousandth war since W.W. II, and the re-opening of new hostilities: Gibraltar was taking on quite a bit of Southern Spain; there was a new Swiss-French & Italian coalition against the German Swiss; Milan was using minor nuclear weapons against Turin, following a soccer game; Israel and its neighbour Rhodesia were joining in a holy war against the Black Infidel; Siberia and North Western China were in a deadlock of attrition, as were the American inner cities in their guerilla warfare with the Americans of suburbia and of the blue pasture land. And, thank God for it, too! Not only was such limited warfare keeping everybody far too busy for a general world war; not only was this false economy burning up labour and production, but this was about the only way populations could be kept down, especially among those with undesirable genes. Preventive medicine and the success of building healthier environments had wrecked havoc by further exploding populations, of increasingly more undesirably endowed people. Wars were about the only factor monitoring a steady state in the world population, now just over a billion ($3\frac{1}{2}$ times less than in the last quarter of the last century of the second millennium). And, of course, the front lines in all these wars were maintained by women and children only. They were especially selected on broad criteria, indexed by their over-adjustment to bad social, psychological and physical circumstances.

Inevitably, when the conferees ran out of reminiscences on the small spectrum of architectural designs for school houses (the little red brick one had been the very best), the historical section turned to the Hall-Dennis report. It was their favourite archival topic because it illustrated a well-known paradox in human affairs: How surely self-conscious and dedicated liberalization leads to absolute tyranny.

In this case, the abdication of responsibility for educational content (curricula) led to the tyranny of abysmal ignorance.

The abdication of discipline, especially the abolition of the master's cane, led to chaos and the burning of all school houses named Sir George Williams or anything like it, including Upper Canada College.

And, the abdication of a marking system led to the pupils regularly sacking the teachers who didn't fail them first, and failed them out of hand, and with no means of checking the subjective teacher judgment.

Of course, by now, Canadian Education had also recovered from the critics of Hall-Dennis report. Consequently, the whole system was in a pretty healthy state.

For those of you who are as yet familiar with the 21st century, I have drawn a brief sketch of the current educational system, which follows my painting first the background of everyday life in Canada.

I might add that this session on the history of education was really a revival meeting held in a hash-den, where the protests like student unrest were re-enacted, and the Hall-Dennis report, and architectural antiquarian designs were reviewed. It all lasted four hours in the morning; actually four times 40 minute periods because no effective activity is continued longer than 40 minutes at one time (maximal span of optimal attention) and because with multi-media technology, the speed-up of information in a modern learning environment gives ample "depth" dimension in four periods; and, in any case, because it was now sleeping time for conference members. And, this is a clue for me to describe to you the flow of everyday life in Windsor and elsewhere in Canada. The single most important Canadian innovation that led to sudden social revolutionary progress and therefore led to the indirect reason why Canada, or what was left of it, became one of the world's most important repositories of human resource was a change in sleep habit.

Pattern of Everyday Life in 2010 A.D.

This is all to do with sleeping; also, with dreaming and with utilizing the precious, creative twilight phase between waking and sleeping. At about the end of the century, Toronto took the drastic step of changing the rhythm of everyday life. It was determined that there should be four hours of continuous activity dedicated serially to:

- I. Work
- II. Play and sports
- III. Leisure, creativity and entertainment.
- IV. New learning or retraining for new jobs.

These four periods of four-hour activities were spaced by two hours of sleep.

This was done primarily to exploit the human resource of alertness and vigilance during waking time, which is maximized by keeping it to four hours only, and by changes or variety in type of activity. The two hours

of sleep are also optimal in that this is all that is required at one time by adults and it is a minimum in which to have a 20 minute reel of dream time. This ensured freshness and rest for each of the four activities. Thus, no one was ever overstimulated, fatigued or breaking down psychosomatically.

The consequences were many. No rush-hour psychosis. Indeed, no rush. Full and total use of man-built enclosures, day and night. Adequate distribution of work, shared work; hence, full employment. Adequate provision for leisure, each day, both in terms of physical health and skills and in terms of creativity. The abolition of diurnal cycles and emancipation from the tyranny of the sun; that is, its presence with natural light and its absence in darkness. (This had long been done at Guelph where "forced photosynthesis" matured plants with greater certainty.) The environment was totally modulated in terms of variable light, sounds, thermal inputs and so forth.

Quite the most important consequence was in terms of the work and home environments. Clearly, with three other defined and specific activities apart from work, and with the home being a place for rest, among other things, a merging had to take place in terms of a continuous, non-hostile environment, encompassing the four periods of waking and of sleeping. The question was: Should people become completely nomadic and rotate among these four activities, and sleep and rest in extended bedrooms in hotels or motel wings, adjoining activity locations? This would mean the end of the home and of family life. Or, should they become more strongly than ever home-based, and walk to the locations of these activities, through entirely pedestrian spaces; a plaza-centred life? The city and eventually the entire country opted for the latter mode. This meant, in many ways, the strengthening of the home, or the private dwelling, from which the enclosures for the other four activities would radiate.

At the same time, the social fabric of family life had been modified drastically. The marriage contract, sealed in Heaven, had become obsolete. Coupling was stable enough, in fact, more stable than ever, but only for a decade or two at the longest; long enough for child-rearing in the first decade of life or so. Clearly, the family as an institution was still the best for child rearing. Beyond the child's teens, however, a single couple acting as parents was regarded as inadequate and, in any case, the media and peers had an escalating influence. Hence, a primary reason, prolonged child rearing for the continuance of the old marriage contract had been removed. Another major reason for marriage had also disappeared: the world league of women no longer needed the security of marriage, or that of remaining a variable part of man's "goods and chattels". In fact, the new millennium saw the dawn of the first truly heterosexual society in which women, although still used for gestation (after adequate genetic and social assessment), were employed absolutely equally with men, although

each sex dominated certain endeavours and enterprises. (Men continued to dominate cooking and the Fine Arts, and women began to dominate the Service industries.)

One important fringe benefit of the man that ensued in the wake of the new sleep rhythm, was the benefit derived by the professionally and even the amateurly creative people, using the twilight state for their poetry, literature, music composition, art or problem-solving inspiration, eight times rather than twice in the 24 hours.

Perhaps typical of Canadian enterprise, this revolutionary innovation in sleep pattern happened more by accident than by design. Its inception was not rational or purposeful. For instance, it was not the result of an effort to stagger working homes or to solve traffic tie-ups, or spread out pollution peaks. Actually, it began as a result of quite a surprising yet a very far-thinking endeavour by the Law Reform study group of Ontario. Their far-reaching searches into the Lord's observance day led to a new definition of a "pause" day, replacing Sunday by a variable day in the week. This, then, led to the idea of staggering work and pauses and to a social, physiological and psychological study of the effects of variable pauses on sleeping habits. This also coincided with newly gained leisure, a curtailment of working hours, a need to share work; in fact, the re-definition of work, and a redistribution of wealth and savings. Thus, from a thorough re-design of weekly cycles, carried out by the Ontario Law Reform Committee, the way was clear for the re-arranging of the diurnal cycle in Canada, eventually adopted throughout the world.

This, being the rough sketch of daily life in the year 2010, it will be obvious to you that education, as such, was an ongoing, daily concern for all. It remains for us to sketch the details of its central system and its peripheral network.

The Educational System

Compulsory education was abolished, inasmuch as education had become a way of life, and there was no way of avoiding it without avoiding life itself. However, those who wanted to avoid life altogether were at liberty to do so, either by living in park land, in supervised colonies, where they were totally dependent on their Keepers, or by electing death, after which their organs were immortalised in other bodies and their own bodies' 90 cents worth of chemical were returned to mother earth.

Formal schooling, in the sense of going daily to a place of assembly, in a multi-purpose building complex, was sustained only for as long as there was a viable home and family based life structure - that is, until the teens were reached. Educational activities were, of course, enriching the entire

environment, the home, via audio-visuals, but also the city itself which was a macro-school: History was written and projected visually on the walls of the city; mathematics was the alternate language to the more traditionally verbal. It was prominently displayed wherever people lived. Music was triggered off lavatory chains, and, this was not the only cultural activity of the bathroom; graffiti went beyond that which I saw the other day in the ladies' toilette: (Anastasia: "My mother made me a homosexual". Apollonia: "If I gave her some wool, would she make me one too?")

Just as children had vast opportunities to play games and sports and sharpen their minds and bodies, so as adolescents they learned, in progressive phases, most of the semi-skilled blue collar jobs. By mid-adolescence they were jobbers, craftsmen, technicians; capable of doing at least maintenance work on all appliances, buildings and machinery. Thus, there was little, if any, distinction between blue and white collar work; and, individuals within their lifetime would be skilled in a vast range of both types of work. By the same token, individual productivity began to be rewarded in the teens, so that adolescents, like adults, were self-sustaining in their educational and other activities, no longer dependent on parents or on the State. The tyranny of Degrees, of the subjective pass or fail judgments, or ad hoc grading, and of the secrecy of reports had all ceased.

For one thing, it was no longer necessary to use the first level of University degree - a B.A. - as a holding space-of-time before the floodgates were open to a labour force, inadequately trained, but ready to soak up the shrinking labour market of suitable white collar jobs. This proved far too expensive a way of keeping young adults off the streets, and, particularly of keeping them off the murderous highways.

For another thing, neither was it necessary to put in time, in idiosyncratic enclosures (schools) in order to get work permits (degrees).

But most of all, the inequities of liberalized education had come to an end. Liberal institutions had neither educated, nor trained anyone properly. The process was culminated by the abandonment of standards, by totally subjective grading and a secret, double-talking reporting system. The student no longer had recourse to the ordinary means of justice built on an objective system of measurement or even an objective evaluation.

Authority's eagerness to remove student anxiety had led to the insecurity of total uncertainty. The student no longer knew where he stood. Already, he had lost his bearings as to who he was. The result was total disaster! To confuse matters further, everybody was against the Establishment, particularly the established teachers. The thing known jocularly as the "educational system" would change every two years, not as a result of any

sure knowledge of pedagogic advance, but more out of frustration and restlessness, causing accelerating changes in fashionable thinking, complete with catchwords and slogans. Education in the 20th Century was like a serendipitous can-can show, changed by the will of the impressarios.

Fortunately, a sober thinking Canadian designed a comprehensive grading system, on increasingly objective grounds. It was mathematically sound. It was automated with the use of computers, and arrived at with the help of students. It was based on a broad spectrum of educational activities built into each educational subject. These activities were evaluated on a number of valid criteria, using multiple but objective standards and methods of tests to which adequate measurements were applied.

This grading system, curiously enough called the Cappon System, in honour of the then Minister of Education, William Davis, had a 30% plan (in its 100% scoring) which allowed each student to choose or pre-empt that much of the range of activities and of the grading on criteria established for evaluation. The student's option was based on his individual strengths. Thus, the marking system was individually tailored, emphasizing the positive; what the student had, less that what he lacked. Moreover, among the multiple standards of evaluation there was consensus of teacher and student, arrived at previous to carrying out an education activity and/or subsequent to the event. Students carried out their own accounting, at least for work done. In short, there was maximum participation of students in their own grading. They kept their own duplicate progress cards and scoring sheets so that they knew, at all times, where they stood and how they were doing - not only with respect to others, but in competition with themselves. It was and still is a completely open system, which obviated special and secret evaluations, favouritism, and generally the whims and fancies of teachers. What is more, it was a useful measurement of the efficiency of the educational system, for it evaluated not only the product, the student, but also the producers - the teachers and the system itself. Henceforth, changes became rational. Incidentally, examinations as a method for assessing amount of error were eliminated, except specifically in those activities where it was appropriate to count student errors.

This ended the era of perplexing questions and conundrums in schools, and therefore generally in society perpetuating early school practices.

This meant that the embarrassing situation in which a colleague of mine found himself the other day, was unlikely to recur: "The Story of the Clinician and his Three Questions?"

Languages and verbal skills were learned early - both at home and in language labs, but never without continual application. This was done not only through student and teacher exchanges with territories of foreign countries, like Quebec, where other languages were spoken, but also especially in North American, through students working and living with immigrant groups who always kept their cultural ties with the old country by preserving their native language. Hence, bilingualism or trilingualism or more was a general feature of educated peoples.

Sciences and scholarly activities were carried out in depth by thorough and long-term original studies and experimentation, wherever necessary in the various neighbourhood laboratories, and workshops and studios, built and manned by government and industry on an equal basis. There was a lifetime for this process of original discovery.

The flow of information was universal and everybody's business, like food and shelter. It was not the privilege of the few.

The greatest emphasis was placed on individual mental happenings, which were no longer the sacred preserve of the few, be they shrinks or any other behavioural or social scientist.

This is why the greatest attention was paid to such a case as I had the other day. "The trucker's nightmare".

Needless to say, it was no longer necessary to spend vast sums on capital (building) expenditure in education and in maintenance costs, etc., because of the dispersal of educational fortresses and the transfer of physical centres to information and communication networks, and because of the employment of students. Also, scholarly penury had ceased because teachers were free to work as consultant to industry and to business enterprises, in a free-wheeling society. The taxpayer breathed a long sigh of relief at the economic implications of this innovation.

The question arose, who were the teachers and who were the students, beyond a certain age and stage of maturity? Clearly, at a certain stage of expertise, mature student (which was the receptive status of all mankind) became teachers of younger and less experienced groups. But, this preoccupied no one but the archivists who justify their existence by accurate pigeon-holing. The common good and enterprise was the thing.

Truth and Consequences

If you like the mental pencil marks adumbrating this sketch of the Year of your Lord 2010, I suggest you go home and bring the emerging picture to life, so that our successes will bring this meeting to Windsor 40 year hence.

Of course, this means a radical change in the Principalities and Kingdoms erected within the existing educational jurisdictions. It means, in fact, being Joshuas and blowing the Walls of Jericho of your own homes; while being ready to implement an exciting new design.

On the other hand, the year 2010 might find our sons and daughters swinging on trees, breathing through gas masks, hating strangers and ready to kill them at the sight of their darkening their cave entrances, and counting on their fingers.

The choice is yours!

FIRE SAFETY REQUIREMENTS FOR SCHOOL DESIGN by K.G. Reilly

The idea of having the Fire Marshal's Office check plans of new school construction, was conceived in Southwest Ontario. In 1957, the Area Fire Prevention Officers approached the Department of Education and requested such a program be established. I believe this occurred after a recently constructed school was inspected and found to be considerably below standard, from a fire safety point.

The Department of Education in turn approached the Office of the Fire Marshal and asked that such a program be established. The program started in January 1958. Since that time we have approved the plans of new school construction, of additions, of alterations, and of renovations to existing schools, as a condition of Department of Education grant.

To give some idea of the number of plans involved; in 1958, the first year of operation, approximately 700 sketch and final plans were examined. In 1969, 849 sketch and final plans were examined, but in all other years approximately 1,300 plans were examined per year. The highest number of plans were examined in 1965, when over 1,500 school plans, sketch and final, were examined. I would add these number do not include plans of portables, or minor projects, which are becoming more numerous each year.

The first edition of the School Fire Safety Design Standard was issued in 1958. It consisted of four mimeographed foolscap sheets, and was used together with the 1953 National Building Code of Canada.

The second edition of the School Fire Safety Design Standard was issued in March 1962. It was a booklet of 31 letter size pages, and was used together with the 1960 National Building Code of Canada.

The third School Standard is incorporated in the first Building Fire Safety Design Standard. This book is now used as a basis for all buildings we are required to approve; schools, hospitals, universities, community colleges, old age homes, welfare buildings, and government buildings, or generally all buildings which obtain provincial grants. We also approve the plans of hotels which have a liquor license, but that program is carried out on a different basis. The first Building Fire Safety Design Standard was issued September 1967, is a book of 95 pages and incorporates the relevant sections of the 1965 National Building Code.

We are presently revising our Standard on the basis of the 1970 Building Code.

Our Building Design Standards are drawn up by a committee of engineers in our Office, and are submitted to various government departments for their comments, such as the Department of Education, the Hospital Services Commission and so on.

In drafting the Standards, we ask not only government departments for comments, but other bodies as well, such as the Ontario Association of Architects, various Boards of Education, Fire Departments, the Manufacturers of certain specific items etc.

Generally our requirements are the same as those of the National Building Code, although, because we are dealing with specific types of Buildings, and not all classes as the Building Department does, we do have some special standards for the various types of buildings. Some of our Standards are less stringent than those of the National Building Code: some are more stringent.

In effect we examine the school plans as an agent for the Department of Education; we do not use our own legislation, (the Fire Marshal's Act) when we examine plans. The Fire Marshal's Act requires that an actual inspection of the Building take place, and enables us to inspect any building in the Province, including schools. This is used as a basis, when on the rare occasion, we inspect an older school. On an arbitrary basis, we consider any school, or part of a school, constructed before the plan examination program started in 1958 as an "older" school. Because of a limited staff our Office does not normally inspect older schools.... except under unusual circumstances. The inspection of schools, as well as other buildings in a municipality, is the responsibility of the local fire department, who under the Fire Marshal's Act have the power to inspect buildings and to require the fire safety to be improved if necessary. In some cases, the local authorities have similar powers under local by-laws.

This brings up the question of the authority and power of local authorities to require additional safety features, after a project has been approved by our Office. Our fire safety standards for a school, or any other building we are required to approve, are intended to provide what we feel are the minimum required standards of safety from fire. We apply our standards uniformly across the province regardless of whether the building is constructed in Metro Toronto or Windsor, or Moosonee. We feel the pupils in all schools we approve must have equal protection from fire. This, for various reasons means some features of our standards will be below local Building Codes and in some cases above local Standards. Fire Safety cannot by any means be considered an exact science, and if local authorities feel all buildings in their municipalities should incorporate certain features, and they pass the required by-laws, then they have the

authority to require these features. The approval of plans by our Office does not relieve the School Board from complying with local by-laws where these are more stringent than our standards.

There is a study underway at the time, however, concerned with the establishing of a province wide building code.

Some features of fire safety can only be assessed by local authorities. For example, fire hose cabinets are installed in most buildings for the use of the fire departments, not for the occupants. In a few classes of buildings, such as hospitals, the staff may be trained in the use of fire hoses, but generally, fire hoses are for fire department use only. Therefore only the local fire departments can say whether fire hose cabinets are required in a school or not, and this decision is left to them.

The checking of other features, such as poor housekeeping, improper use of exit facilities, etc. in a school regardless of when it is constructed must be left to local authorities, because in approving the plans of school construction we can generally only check construction features.

Local authorities are also responsible for inspecting existing buildings in their municipality and under either the powers given them by local by-laws or the Fire Marshal's Act, they can require the standards of fire safety be improved.

If the improvements are required under the Fire Marshal's Act, the owner may appeal to our office; if the improvements are required under a local by-law, there is no right of appeal to the Fire Marshal, as we have no power to over-rule a by-law. We expect and trust that local fire prevention bureaus will inspect older schools which we have not approved and require that fire safety be improved where necessary, as this is the only way the pupils of these schools will have an adequate degree of safety. It should be noted when we approve the plans of an addition to an older school, except under unusual circumstances, for example, an addition being constructed over an existing building, we do not ask the fire safety of the existing building be brought up to standard as a condition of our approval of the addition. The general exception to this, is our requirement for the installation of an approved fire alarm system throughout the entire school (because there may be only one fire alarm system in any school.) We do not however, permit the construction of an addition to result in existing conditions being made worse, and under these circumstances may become involved in some aspects of fire safety in an existing school when approving the plans of an addition. Therefore, the fact we have approved the plans of addition to a school is no guarantee the entire school meets our standards. There is a good possibility some fire safety features are sub-standard if

the school was constructed prior to 1958. While local authorities may have some responsibility when they inspect the buildings, the ultimate responsibility for fire safety in any school rests with the school board as owners. Therefore it is in the best interests of all concerned for the school board and local fire prevention authorities to co-operate during such inspections, and in the establishing of long range programs to improve the fire safety of older schools.

It is my understanding there are Department of Education grants available, when under certain circumstances, the fire safety improvements, which comply with the standards of the Fire Marshal's Office are undertaken. Any plan to improve the fire safety of an existing school should be carefully investigated on this basis.

The main ideas of our plan examination program, of course, is to avoid the problems of improving fire safety in existing buildings. It is much easier, and far less expensive, to change lines on a drawing before the building is constructed, than trying to construct or knock down, a wall after a building is standing. Another important feature is that the occupants of such a school should always have the necessary standard of safety from fire from the day the building is opened, until it is demolished, assuming there are no authorized alterations, and also providing the occupants themselves take the precautions for which only they can be responsible. This last item is most important. The occupants of a building must take certain steps to ensure their own fire safety. It is of little value for an architect and myself to spend hours discussing and arranging certain fire safety features in a design, for the school board to spend money incorporating these features in the construction, and then to find the occupants do not make proper use of these features. Two examples which came to mind are fire alarm systems and stairwell fire doors. I have visited a number of schools and found fire alarm systems inoperative.

In one case the system had never been turned on at the main electrical service, even though it had been installed two years previously. The complaints about stair doors are well known, but you cannot change basic laws of nature - smoke (and it is smoke and superheated gases that kills during a fire - very rarely is anyone killed by contact with the flame) rises vertically and rapidly through open stairs (ones which are not protected by fire doors) thus preventing evacuation. This fact exists; it cannot be changed as much as we wish it could, and the only way of providing some possibility of a smoke free path of egress from multi-storey buildings, is by properly designed stair enclosures. These only function properly if the fire doors are kept closed, to prevent the spread of smoke up the stairs. The school board is responsible for having these doors installed (the persons in actual charge at the schools should be informed

of the reasons for keeping the doors shut as well as the responsibility of the board, should a fire occur and the doors are not closed). In the final analysis, however, whether the doors are closed, so the stairwells will function as intended in an emergency, rests with the occupants of the building themselves. I feel this, and the proper use of other fire safety features is a matter of education which could be undertaken on a co-operative basis, by the school board and the local fire prevention bureau.

Just an example, of how effective such a program may be, other representatives of this Office and myself have recently visited a large number of schools in an area of the Province where we are currently investigating school construction. In approximately 70 multi storey schools, with enclosed stairs, I can remember only two where all fire doors were not shut. In some cases there were stickers on the doors, issued by the local fire prevention bureau, and I was informed one of the school boards involved issues a memorandum every two months on this subject.

As indicated previously, some of the credit for conceiving this plan examination program rests with the fire prevention bureau in this part of the Province. I suppose an architect who has had some brave new design affected by fire safety standards, or a school board administrator, who has had to find extra money for fire safety improvements may be substituting the word "blame" for "credit"; however, if you are in the fire safety field or even more important, if you are a pupil or teacher in one of these schools concerned, the word is definitely "credit".

The theory behind our plan examination program is simple - the architect and the board have copies of our Building Standards, to be used as a guide in the design of the school. Sketch plans are submitted to us for examination and comments at an early stage. Finally the complete working drawings and specifications are submitted to us for examination. At this time, the board and its agents are advised of any changes that must be made.... so the school will incorporate the required fire safety features. Confirmation must be provided (to our Office) that the school will incorporate all the required fire safety features and all necessary changes will be made. On this basis it would seem, a simple matter to incorporate all necessary fire safety features in the actual construction.

On paper this looks simple, but unfortunately it has been found in many cases, the program has failed to some extent in its final step - between the final plan examination and the construction - or in the actual incorporation of the requirements during construction.

This Office does not inspect every school, or any other type of building, for which we approve plans. For one thing we do not have the large

staff which would be required for such a program, nor do we feel we should have to inspect. After all, we have been informed by responsible people, (i.e. the architect and/or the school board) all our requirements will be met. These people assume responsibility for ensuring the approved drawings (including any necessary addenda or change orders) will be followed.

We do however try to visit a number of schools in an area, to sample, as it were, the work in the region concerned. I would stress to both architects and school boards that when we visit a school, it is for this reason only. Some architects seem to feel it is because we are suspicious of their work - such is definitely not the case.

While we have found a number of cases where our requirements have been totally ignored, such cases in comparison to the number of people and projects with which we have been involved, are minor in number.

We have, since the plan examination program started, checked on the construction of approximately 800 projects. I am sorry to report in a large number of cases, far too many cases, we have found one or more of our requirements have not been incorporated in the actual construction. In a number of cases, all our requirements have been disregarded. In many instances, such omissions have been of a major nature, for instance, combustible wood fibre tiles installed where we asked for non-combustible tiles; an exit door not installed; the wrong type of fire alarm system installed etc. In some cases the deficiencies have been what people may tend to call minor in nature, such as the wrong type of locking hardware. In a recent fire in a school in Ontario however, a number of students could not get out of a change room because a door was equipped with a deadlock which prevented it from being opened. Fortunately someone in charge found the key and opened the door, but from reports it would seem to have been a close call - so under certain circumstances, it would seem any omission could be a major factor and no omission can be considered minor.

I do not want to give you the wrong impression. Just because we have found some deficiencies in a fair number of projects, I certainly do not consider this program a failure. The vast majority of the major fire safety problems...that might formerly have occurred, have been avoided because of adequate planning before construction from the fire safety standpoint. Such things as dead end corridors, open stairwells, inadequate exit widths, inadequate construction, etc. are not normally found when we visit a school for which we have approved the plans. These are some of the more important factors affecting life safety in any building. They are also some of the most costly and difficult problems to rectify as anyone who has tried to improve the fire safety of an existing building well knows.

As long as some of our requirements are only met on paper, and not in the actual construction, however, we are concerned.

How do these deficiencies in construction occur? While it is not our responsibility to determine who is at fault, in such cases, and all we are concerned about is that such deficiencies be rectified, it would seem these deficiencies may result for a number of reasons.

1. An architect or school board for one reason or another may choose to disregard our requirements. As indicated previously, I feel such cases do not occur too frequently, and actually, because in such cases a trend usually develops, are the most easy to detect, I do not propose to dwell long on this matter.

2. Subsequent modification to approved plans or subsequent alterations to the building by the school board, after it has been in use for a number of years. These are probably the most difficult to detect as a constant inspection program would be required.

Fortunately, to the best of my knowledge, such occurrences are rare. In most cases, it would seem such changes occurred because of a lack of knowledge or misunderstanding of our requirements, especially on the part of small boards who operate a small number of schools. Unfortunately the fire safety of the building is affected by such changes, lack of knowledge not withstanding, and the board must assume the responsibility for actions.

3. The main cause of deficiencies seem to be a breakdown in communication between the school boards or their agents and the contractors - an addendum may be issued, which contains changes required by us, but the changes are either not incorporated, or incorporated incorrectly in the construction. This happens too often - either because of lack of supervision on the part of the board or its agents, or because of some misunderstanding on the part of the architect or contractor, or both.

Regardless of the reasons for these deficiencies, the results are the same - one or more fire safety features are not incorporated in the actual construction. The problem is how to avoid or greatly reduce the chance of these deficiencies occurring. Hopefully, most of these can be solved by the school boards themselves. In the final analysis, as owners of the building, the boards have the ultimate responsibility for fire safety in the schools. With the development of the regional school boards, the great majority of boards now have on their staffs persons responsible for the construction and planning of schools. As such these persons should be thoroughly familiar with our requirements. In the case of proposed modifications

to existing schools, these persons should ensure plans and specifications of the modifications are sent to our Office for approval.

In the case of building projects where the plans are sent to us for approval, copies of all pertinent correspondence are sent to the school board and to the architects. During and after construction, it is a simple matter for a representative of the architect and the school boards construction department, to inspect the school against the comments of our letters. This is generally what representatives of our Office do, when we visit a project - it can be done in a relatively short time - and because of the school boards' responsibilities in such matters, I do not see how any board can afford not to do this.

I hope I have given some idea of how our plan examination program is intended to work, and the task each of the parties concerned - the architect, the school board, the local fire prevention office, the Fire Marshal's Office and even the occupants of the schools, - must perform in obtaining schools in which the occupants are safe from fires.

CONTROL OF ENVIRONMENT by J.G. Haywood

I think we realize there is more to classroom environment than climate, and such things as classroom colour schemes, lighting intensities and layout all affect the total environment, but it is the topic of heating and ventilation on which I wish to concentrate.

Although heating and ventilation systems for school buildings are really no different to other buildings, there are some peculiarities to school design which have a bearing and which should be studied a little closer.

The primary consideration of a heating system is to maintain adequate indoor temperatures regardless of outdoor conditions, but as we will see later on, cooling has really more significance than heating.

The second function that a good system will perform is to adequately ventilate the space. School classrooms rank among the top when it comes to population density and therefore the problem really becomes one of trying to maintain sufficient clean fresh air in the room to supply oxygen, remove odours and give that general feeling of freshness. It is not generally well known that whereas it only takes 4 cfm per pupil to supply oxygen and dilute CO₂ to satisfactory level, it takes somewhere between 15 and 20 cfm of fresh air per pupil to keep the odour level down to something acceptable.

The other functions that a mechanical system has to perform are to maintain relative humidity at an acceptable level, provide a measure of air movement in the occupied zone and do it all at a reasonably quiet noise level. It is generally considered that humidity is not really that critical but the increasing use of carpeted areas in schools has made the maintenance of a high enough level to prevent static buildup a well worthwhile criteria.

Basically then a good system should provide all these things at a reasonable first cost and not excessive operating and maintenance cost. This is the challenge.

Before we proceed to evaluate some types of systems and the relative advantages and disadvantages of them, I would like firstly to pursue this problem of classroom temperature control a little further and with that in mind I would like to do this with a couple of typical classrooms we have encountered recently.

The first one is a typical classroom of a "finger" type structure of 830 sq. ft. floor area with 96 sq. ft. of glass, double glazed and U values of .14 for roof and wall. A calculation of heat loss shows this to be 25 MBH (MBH = 1000 British Thermal Units)

and if we plot a curve of heat loss versus outdoor temperatures we get the first line shown on the graph. Turning on the lights in this room generates 8 MBH of heat and so the second line is moved up by that amount. Thirty pupils generate another 7 MBH and so this is plotted. A typical solar heat gain is then added and we get a line for loss or gain with the room occupied and the sun shining. You will now see that the balance point in this room is around 5 degrees F. i.e. at outdoor temperatures above this figure the room has to be cooled to maintain inside conditions. You will also note that this room requires about 25 MBH of sensible cooling exclusive of ventilation, at outdoor temperature of 75 degrees F.

The second classroom I would like to consider is one of a more compact design with minimal windows. In this example the room is of 700 sq. ft. with only 11 sq. ft. of glass and U values of .09 for walls and roof. In this case the heat loss works out to 8 MBH and the four lines are plotted as before.

As will be seen the curves for this type of room are much flatter and indicate that as long as the room is occupied with lights on, regardless of sun, the room will need cooling. Also note that only 20 MBH of sensible cooling is required at 75 degrees F. outdoors, again exclusive of ventilation.

Now if we go back to our evaluation of some types of systems we can appreciate the original point I made, namely cooling is more important than heating.

The first and probably the oldest type of school room system we will consider is the use of under the window radiation with exhaust ventilation. Well I think it follows that this is not going to be very satisfactory since while the system is able to provide heat it is not able to provide any cooling except by opening windows and drawing cold air in through the exhaust system. Windows for control of ventilation are a very poor second best and teachers have a lot more to do than open and close windows. Also there is no way to stop the pupils near the windows getting cold drafts while those at the inside walls are hot and uncomfortable.

The second system which was in common use about ten years ago was the use of radiation as before with ventilation air being blown in from an inside wall high up. This system still has the major shortcomings of the previous system in that no control of cooling is available but the ventilation was at least steady and could be designed to satisfy most of the other criteria.

The third system in fairly common use these days is unit ventilators. This system does provide most of the criteria we have mentioned, provided the outdoor temperature stays below 60-65 degrees F. In this system the units draw in increasing amounts of fresh air as the outdoor temperature rises. Relief dampers should be provided, however, to permit displacement of the air volume drawn in by the fans. One criteria that this system cannot provide, however, and that is humidity control and to my mind the multiplicity of

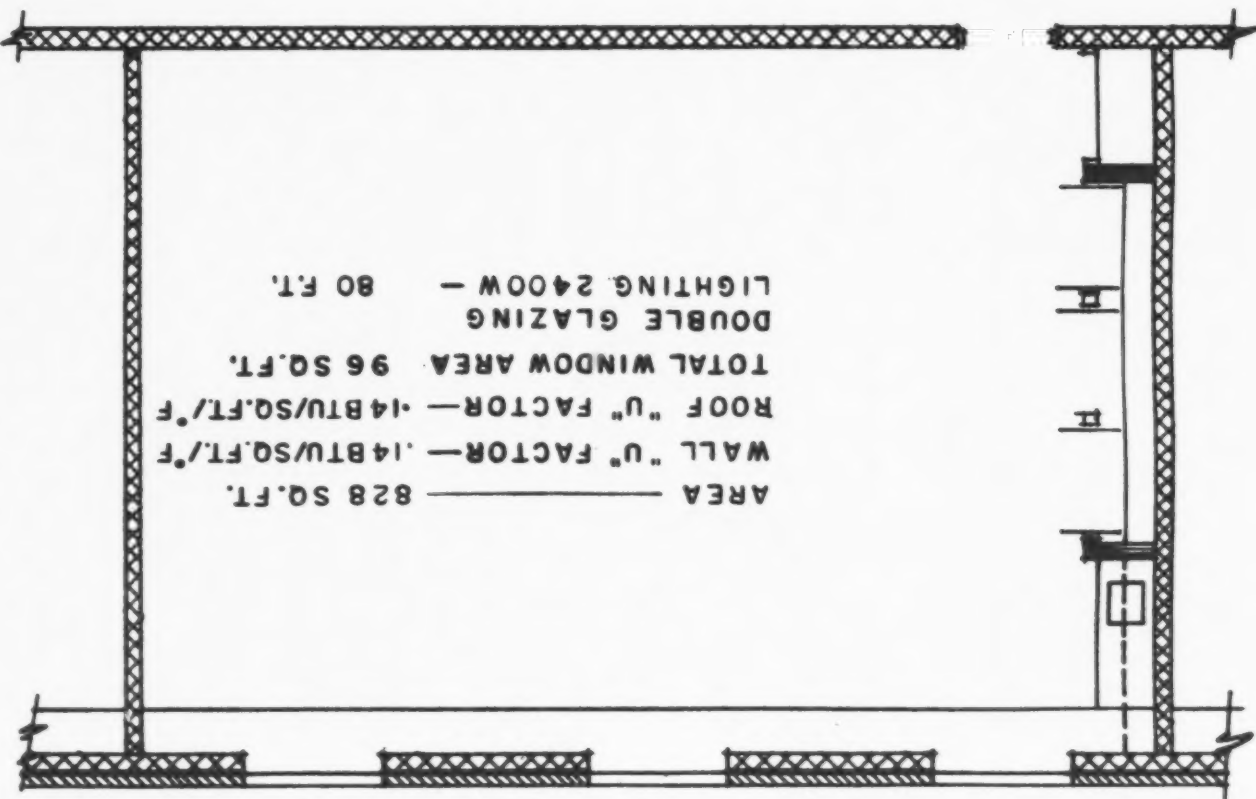
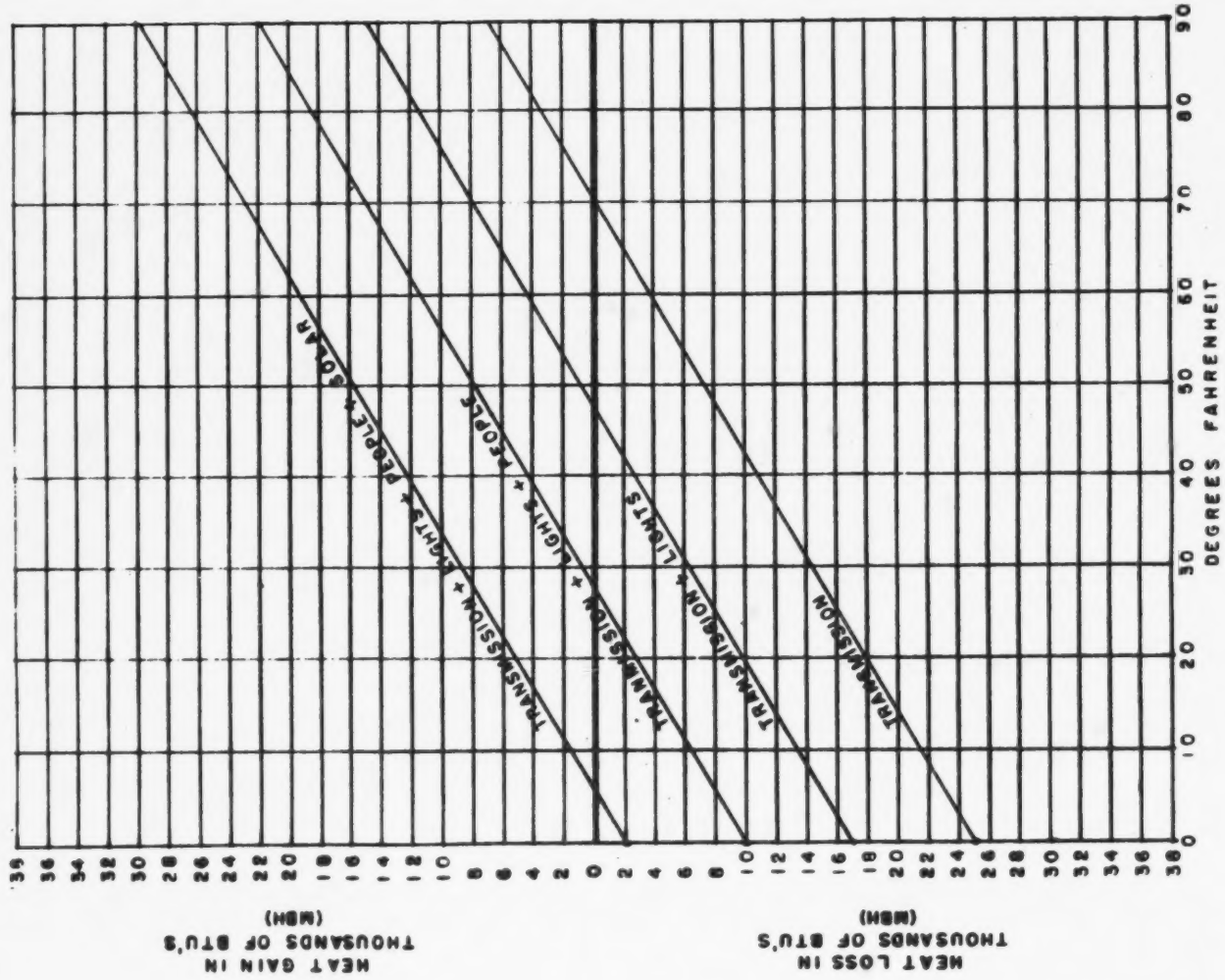
motors, controls and filters does not improve the maintenance aspect. One other system which has the same overall efficiency as unit ventilators with some advantages is a reheat system. This may be a combination air-water system or an all air system and here the air supply, which should be sized for cooling, is terminally reheated to satisfy the room conditions.

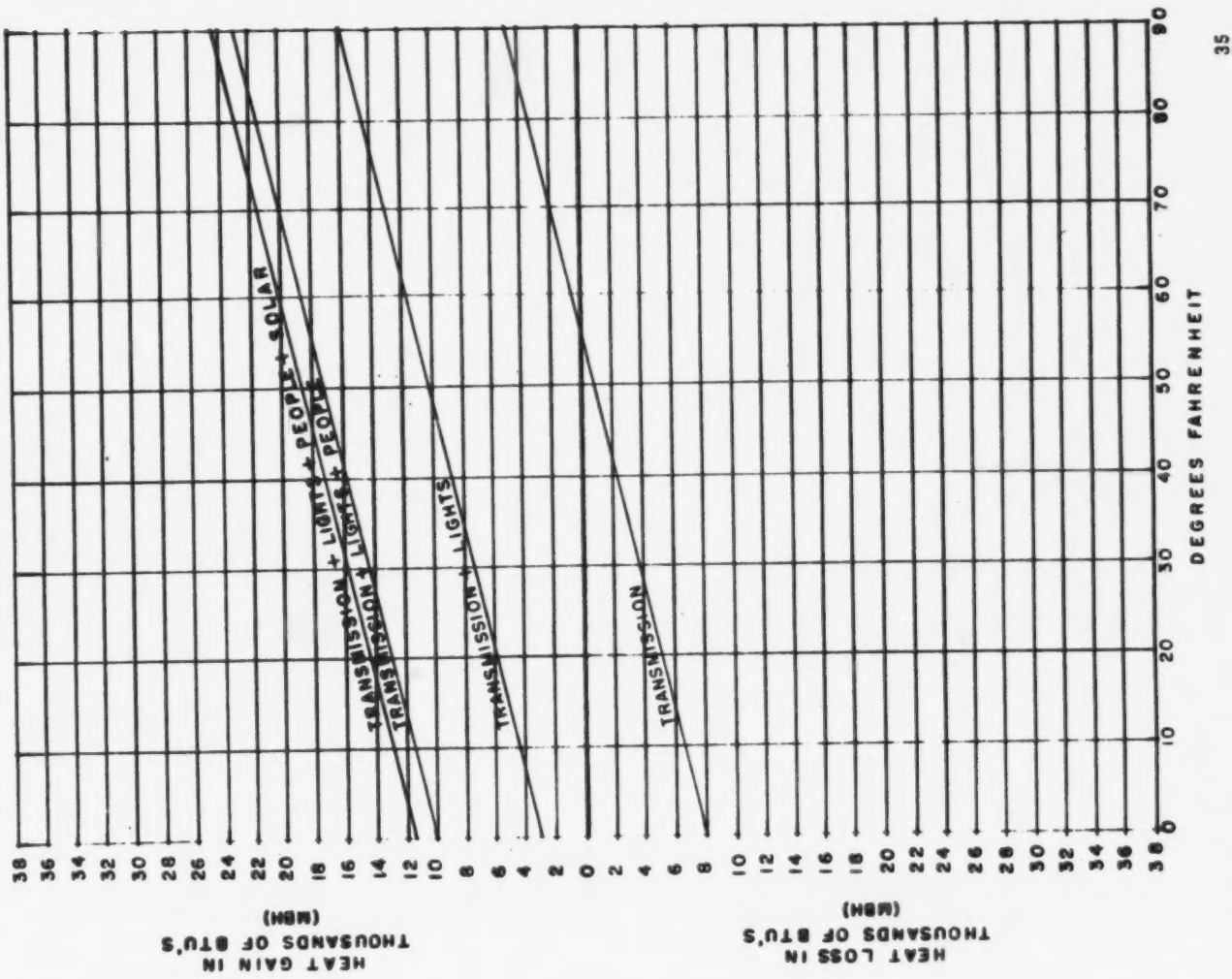
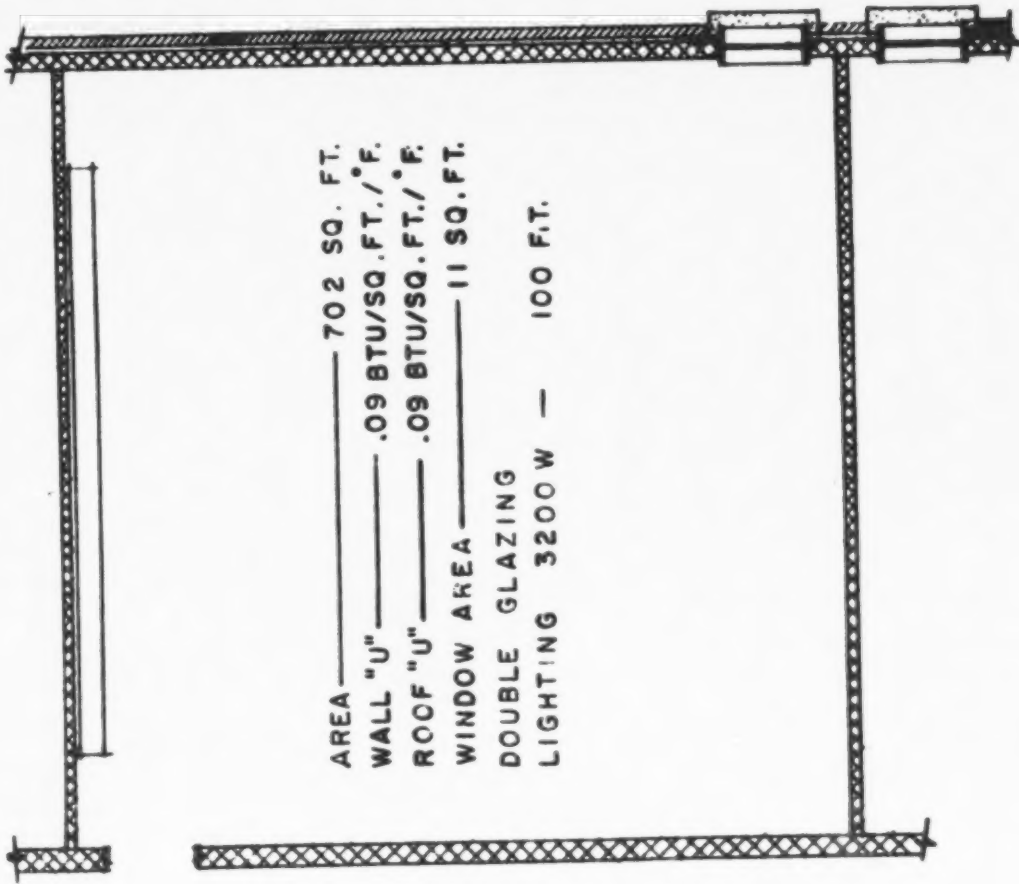
To illustrate one variation of this system I would like to show a variation we have used quite successfully in schools around this area. In this system the main primary air is distributed by under slab medium velocity ductwork to long distribution ducts built into the book shelves over which the finned element is run. The air coming out of the supply duct through long slots has the effect of inducing an equal quantity of room air in the return grille and out the top so that whereas the supply air may be 55 degrees F. the air coming out of the top grille is on the order of 65 degrees F. aiding the air distribution. This system also has the advantage of providing the heating under the windows, when and if needed, still operate as a gravity convector on night cycle and only requires the one valve and thermostat per classroom in addition to the main fan cabinet controls.

One disadvantage is that, as for the unit ventilation system it is not possible to add humidity to the building.

We have done jobs similar to this for about \$2.70 per sq. ft. The last system I would like to show is one suitable for the compact type classroom shown earlier. In this system the reheat boxes are located in the corridor ceiling spaces and air is distributed by ceiling diffusers. Note that in this system there is no need for perimeter radiation, leaving the walls clean for any furniture layout. Also note that we are using heat removal troffers in which a small amount of return air is drawn back through the light fixture, picking up about 50% of the heat before it actually gets into the space. In this way the cooling capacity is not reduced but the circulated air quantity can be cut by about 25%. On jobs we have done like this we have incorporated mechanical refrigeration and the total air conditioning cost has been in the order of \$3.30 per sq. ft.

We feel that with the trend to longer and larger school years that this is the system of the future and we expect to see more of this type of system in use in the future.





CONTROL OF ENVIRONMENT by G.F. Costello

When I was invited to talk on such a profoundly sounding subject entitled "Control of Environment", to such a distinguished group of people, who are responsible for the planning, developing and administering of our education systems, as well as, those who plan and build the facilities, in which to carry out the educational process, I must say that it took me sometime to find how I would approach the subject.

After considering some possible areas which have an effect on our environment, I decided to direct my remarks to the following:

1. Standardization of Systems
2. Accessibility of Equipment and Controls
3. Servicing and Operating Instructions
4. Training and Certification
5. Periodic Inspections and Records

If we consider that approximately one third of the cost of most modern schools is spent on service equipment and facilities, it is imperative that the equipment, so installed must be kept at its highest possible operating efficiency.

Studies have proven that the quality of the thermal environment can and does affect the ability of the student to learn, to study and to concentrate. If the student is too cold he is distracted, and if he is too hot, he will become drowsy and inattentive; therefore, the maintenance of the proper thermal environment is an important factor in making the most productive use of teaching time.

Maximum learning is directly related to comfort levels - four factors which affect body comfort are: 1) air temperature 2) radiant temperatures 3) relative humidity 4) air motion.

At this point we must remember that temperature setting should be for student comfort and not for teacher comfort, because teachers are generally comfortable at higher temperatures than students. (There is a story told about the elderly female teacher who continually complained during the winter months that she was always cold. She would constantly request the Custodian to increase the temperature in her room, which he would do promptly. The principal would then visit the teacher's room and would instruct the Custodian to turn down the temperature in the room in question. This went on for sometime, until the principal finally won out by telling the teacher to put on a sweater and not to request the Custodian to adjust the controls.)

Now let us turn our attention to discussing the five areas which I mentioned at the outset of this paper -

1. Standardization of Systems:

I fully realize the difficulties that must first be overcome to standardize, when most of our school systems at the present time, most likely have five or six different types of heating, ventilating and cooling systems. However, we must start somewhere and why not consider, if you have not already done so, to standardize now, in the present year with your next building project. It has come to my attention that certain boards, particularly in the Metro Toronto area, have set down certain basic specifications covering this entire area. There is not one simple solution to this problem and it will take time to accomplish this task, but, the economies effected and the efficiency and convenience gained, will be well worth the effort put forth.

2. Accessibility of Equipment and Controls:

Human nature is the same today as it was yesterday and it isn't going to be any different tomorrow. So let's face it, the person responsible for servicing the mechanical and electrical equipment, contained in or on a given building is most certainly going to find the easiest and least strenuous way of performing his task, and if he just doesn't feel up to climbing ladders, walking cat walks, lifting trap doors or straddling on a set of beams; he just won't take the trouble to do a proper job so, as a result the equipment will either be serviced on an irregular schedule or will just not receive service at all, not to mention the safety aspect. When this is the case, we all know what happens - the moving parts will seize and in a very short time the equipment in question will have to be replaced. I have no specific answer to offer now, to improve this situation, but, I am quite confident that those among you who are designing systems and facilities, will come up with an alternative to this very real problem. I know it exists because, I work with maintenance and custodial personnel daily.

3. Servicing and Operating Instructions:

How many of you have seen a section in a specifications project manual which may read as follows: "Upon completion of the control systems a competent mechanic shall calibrate all instruments and check each control panel to ensure systems and instruments are functioning satisfactorily. To provide the services of a mechanic to the owner's staff for as long a period as necessary to ensure operation of systems are clearly understood."

Now, I wonder how many contractors have lived up to this obligation or have they either left it up to a mechanic, employed by the Board or left it completely up to the Custodian to discover for himself, how the systems operate - hoping that he will press the right button or turn the right control at the right time.

Carrying this a step further, administrators or plant supervisors should be aware of the guarantees placed on equipment and hold the contractor responsible for replacement of any defective parts.

4. Training and Certification

With the increasing amount of expensive and sophisticated mechanical equipment being introduced into our school plants, it is a must for boards to develop and finance basic courses for the servicing and operating of mechanical systems for their Custodial staffs. I don't know of any better way to set up this type of program than in co-operation with our local Community Colleges, Technical Division. We in Middlesex County have an arrangement of this kind with Fanshawe College at the present. However, the program is only in its beginning stages, but, we do hope to expand this program in the new term.

5. Periodic Inspections and Records

I am quite sure that most boards in this province have one program or another to have annual inspections carried out of their schools heating, ventilation, and controls. If you do not have a system of inspections you are as the saying goes "penny wise and pound foolish".

All of the major manufacturers have preventive maintenance programs, which they are pleased to establish for a consideration, I am sure.

In conclusion, I would like to leave two thoughts with you: firstly, a quotation from the Hall-Dennis Report entitled School Facilities at page 89 - "The Ontario Student has a right to expect a school environment that reflects the age in which he lives" end of quote. Secondly, the soaring cost of Education is being brought sharply into question at every level - by the householder, Municipal Councils, Industry and Commerce, Provincial Governments as well as The Federal Government.

Those who are financing our education systems are entitled to expect the best use of the facilities provided in the most economical way.

THE SCHOOL AS A COMMUNITY CENTRE by G.H. Miller

Introductory Statement

I feel it is most important to approach the subject of our discussion today from an educational context. I do so with the full knowledge that education is the target of many "brickbats" and the subject of endless editorials, articles, books and periodicals - making it a "politically sensitive" topic in any gathering of taxpayers such as this.

A recent series of editorials in the London Free Press started with the following statement:

"School costs are the most persistent factor in rising municipal taxes which are imposing a crippling financial burden on property owners. Exhaustive examination of the financing and operations of Ontario's school system is needed to devise means of alleviating the strain on taxpayers and yet ensure a high quality of education".

Let me first identify a prevalent myth which is perpetuated in such statements as the above quotation. --

We have been brought up to believe that schooling is synonymous with education and that the board which is responsible for our schools is therefore responsible for education.

The first part of this myth is open to serious question if we interpret education as the development of the individual's capacity to live in today's world. We need only reflect upon our own learnings to recognize that our knowledge, skill and attitude have changed considerably since leaving school. Even if we include the universities with their expanding enrolments, and the newly mushrooming "community colleges", we are still covering only a small part of the total educational opportunities now available in this province.

More and more we read and hear such terms as "the educative society", "adult education", "preschool education" and "continuing education". How many community agencies, organizations and groups can you name that do not have, explicitly or implicitly, in their objectives, an educative function? Add to these the family, neighbourhood groupings, libraries, galleries, the news media etc., and we begin to see something of the scope of educational opportunities.

The late Ned Corbett, first Executive Director of the Canadian Association for Adult Education said -- "I have --- a conviction that the desire for knowledge is a normal human appetite, and that the capacity to acquire knowledge continues throughout life".

At a recent provincial conference, the Honourable W.G. Davis, Minister of Education for Ontario outlined four areas of concern for education:

1. Education for life as a worker.
2. Education for family life.
3. Education for public life.
4. Education for the better life.

The late Dr. Z.S. Phimister, while Deputy Minister of Education stated:

"We are struggling on to a new plateau in education -- off the skill plateau to another, which I shall call the value plateau. We shall become more concerned with the problems of finding satisfaction in living, with the meaning of life itself, and with the values we attach to existence ---. I hope you will come to believe that man is capable of greatness and goodness, and that you will assist us in coming closer to these aims".

How far have we progressed toward the ideal of the "educated man" when we are surrounded by pollution, poverty, war, reluctant change, conflicting ideologies, death and decay, and when "speed", "grass", "acid", nihilist, hippie, yippee, "pig", sit-in, strike confrontation, student power, are where the action is!

Now let us look briefly at the second part of the myth -- that the authorities responsible for our schools are therefore responsible for education. If we believe in a philosophy of total community education, should not our schools and our educational authorities be consciously bringing their operational practices more in line with this philosophy? This would certainly be consistent with the announced intention of equalizing educational opportunities across this province.

If we sincerely believe that education is a continuing process involving the whole community, why should so many of our school properties be fenced and locked at least 70% of the year? Why should these community facilities be used only by 5 - 16 year olds, for seven hours a day, five days a week, for approximately 40 weeks per year? And why should we continue to believe that only a certified teacher can conduct a meaningful learning experience?

With the increasing burden of taxation and the growing concern about educational costs, it would appear reasonable and practical for educational

and municipal officials, together with private citizens to cooperatively examine ways of increasing the use of the excellent education facilities we now have and of influencing the design of new properties so that they can effectively serve the needs of our "learning society". We also need to free the system from the constraints we have imposed on it and expand its involvement with the community to which it belongs.

If we look across the province there is increasing evidence of this sort of cooperative planning and operation. Here in Windsor two schools have been designated as "community schools". London, Hamilton, Owen Sound, Mississauga, Etobicoke, North York, Pickering, Ottawa and many other locations are experimenting with various forms of school-community partnerships.

There is a growing realization on the part of educational authorities that "community relations" must be strengthened and that "community education" is more than just out-of-school education. Co-operation with municipal authorities and citizens is not only desirable but is urgently needed in order to cope with the increasing alienations and other social problems of our society. The pressure is greatest in our urban centres but we also need to concern ourselves with similar coalitions in the less densely populated areas of this province. Otherwise the intention of equal opportunity in education is meaningless.

The school is a community institution and must concern itself with the community. Education must assume its share of responsibility for improving our society. The effective power of education in the solution of social problems depends very greatly upon the decisions of how our schools are used and on how relevant are the opportunities for learning. Hence we need to re-examine the basic function of the school and make it a centre of service to help all people learn how to fulfill their wants and needs.

Such a school, which takes the lead in community development and in the solution of social problems, may appropriately be called the "community school". This concept incorporates but goes far beyond the relatively simple use of the school as a community centre. It supplies a very broad viewpoint of the function of the school, of the school day and year, of the curriculum and of the student body. Community school implies a collaborative and cooperative effort on the part of school personnel, municipal and community agencies, and citizens toward the provision of a learning program for all the people irrespective of age, creed, background or interest. Such a concept not only bridges the gap but could fill the deep moat that has developed between our schools and the community.

The challenge is not why, but why not!

-- not how, but how soon!

SCHOOL AS A COMMUNITY CENTRE

by E.H. Brohman

Education is a function of the culture. Recent innovation in the schools of Ontario is geared ideally to the well-being of the individual, to the extension of freedom of choice, towards individual achievement and of the moral forces that are developing in our community experience. The purposes of education refer to (1) the individual, (2) the society and (3) the culture.

The individual in our schools has achieved the centre of the stage where involvement with economic, political and social life must be forged. Our schools can properly be described as "peoples' schools". The integration process which began as K-13 is also concerned with adults not ordinarily in the school spectrum. We have accepted the fact that automation and social change have made it necessary for adults to retrain several times to match the requirements of industrial and commercial enterprise.

The aim of the Board of Education which I represent is to make available educational resources and opportunities to aid the individual to know himself and his world, and to assist him to participate in and enjoy a meaningful life as a member of society to the extent that his needs, abilities, aptitudes and interests permit.

Education applies also to the quality of the culture, the substance of its values, the intellectual, artistic and spiritual norms by which we live and by which our judgments are made.

In the years ahead education in Ontario schools will have a growing impact upon the total life of our society. Schools are entering an era of new and changing social environments which places rising expectations on the function of the school associated with its related community agencies.

The community use of schools has received "lip service" but rather infrequent coordinated action for many years. Problems to be faced have dealt with divided administrations, restricted budgets and undefined responsibilities. An example of this in our county is the building of an indoor pool attached to a school building. How does the school board share construction costs with the community pool committee? Who has the right to the land on which the pool is built to facilitate legislative grants? Can the general public feel that they will continue to have autonomy and use of the pool during after-school hours?

School buildings are expensive resources and the public will wish the right to enjoy their widest possible use. Our county, using an example, has found the cooperative venture with the County Library Board, for the use of several of our school libraries as public libraries after-hours, to be a most desirable one. The advantages include an expanded selection of books, easy reference resources for teachers and pupils. Joint financing for capital expenditure such as audio-visual and T.V. equipment and the valuable opportunity for the public to have firsthand acquaintance with what is going on in its schools. The happy situation where one of our industrious and dedicated young physical education teachers was chosen as a part-time municipal recreation director has produced exciting community dividends. The principle of integration of school facilities enabled the community track club of perhaps 100 boys and girls to have the use of the high school athletic field and track all summer along with gymnasium, shower and changing room facilities. One of the most meaningful experiences came from checking the inventory of equipment when only the Director had awareness of what belonged to the School board and which items were recreation property. This same young man has organized a weekly activity program during the regular school year, coordinated with the high school evening class program for 300 elementary-age children. He has had the voluntary assistance of an adequate number of parents to act as leaders and organizers.

Only as a school expands these "extra" services can it fulfill its total function according to today's standards. As the philosophy of John Dewey is being understood and applied, the separation of school and life is ending. Today more of actual life is entering the school and more school is taking place out in the community. To quote Mr. J.G. Davis, Assistant Superintendent, Curriculum Branch, Ontario Department of Education, who has special responsibilities for the development and encouragement of out-of-school education, "Extending the learning activities of the classroom into the natural environment of the outdoors provides the opportunity for direct experience -- a multi-sensory approach to learning using the proven learning devices of sensation and perception in a real life environment."

When the average classroom teacher plans to extend the indoor program into the real world, she might think of a bus trip to a museum or to an art gallery, depending on the state of the school excursion budget or perhaps arrangements for a week-end residential experience at a well-equipped, board-owned centre or one of the excellent Conservation Authority centres. Or would the children profit from a visit to the airport, the radio-T.V. station, a historic walk through the community, a field trip to a nearby farm? What treasures are awaiting discovery and observation on the doorstep of the school, the woodlot nearby, the vacant lot down the street, the swamp at the foot of the hill and even the schoolyard itself?

The Hall-Dennis report has made the suggestion that "the school effect a liaison with all other educational agencies in the jurisdiction, which will result in a more complete service for community education".

Boards of Education are striving to provide the best return for the taxpayers' dollar and are considering carefully (1) a summer education program and (2) a continuing education program in the evenings for youth and adults.

The coordinator of the summer program will contact organizations such as recreation groups, women's groups, post-secondary institutions and the Y.M.-Y.W.C.A. with a view to coordinating programs. The summer education program will provide opportunities to bring the subject of the regular school year to a successful completion followed by promotion but it will also provide for two new areas of study (1) subjects for credit which a student was unable to timetable in the regular school program and (2) subjects of a cultural or interest nature. At almost no cost the summer student may enjoy an educational experience of his own choosing in a school-without-rules setting. Our experience indicates that as well as contributing to success in educational achievement and satisfying the interests and desire of students in new and different areas of study - girls in auto maintenance; boys in gourmet cooking, etc. - a significant change of the attitude of the adolescent towards school and teachers was achieved. The comment, "Man, these teachers are human!" seems relevant. Another observation which seems significant is that 990 pupils, grade 7 to grandmothers, and teachers can be enthusiastic about learning in 90° temperature classrooms.

The continuing education program provided several interesting observations:

(1) the program in three rural secondary schools of the county enrolled 98% of 560 participants in non-credit classes ranging through the craft subjects of copper and leatherwork, ceramics, welding, oil painting, cake decorating, radio construction, knitting, dressmaking, creative writing, french conversation hairdressing, etc. We were never sure whether the knitters were more interested in the yarn or the gossip and we wondered what new impact one hundred and forty hairdressers would have on their husbands; (2) the two urban school centres enrolled 1400 participants with one-fifth of their numbers in credit courses.

We have been discussing the school and the community largely from the advantages to the participants, both young and adult. Some of the most permanent satisfactions to teachers grow out of participation in the life of the community. Traditionally, teachers have been somewhat isolated from the community. Fortunately, conditions have changed. Now a school board encourages teachers to work in settlement houses, to take part in camping activities and to arrange continual acquaintance with and recognition of new

developments in the worlds of business and industry. Teacher-education institutions are equally aware of the importance of educating their students for both the classroom and out-of-school services.

Teachers are receiving as well as giving. Through community involvement they become acquainted with parents, they develop new interests, they learn to understand and appreciate problems confronting their pupils. The efforts to control and prevent drug addiction in our students is being approached through teacher-pupil rapport and credibility.

Community improvement cannot be legislated; it must be fostered, researched and studied by the planning agencies but in the final analysis it is the responsibility of the people. Our schools have an infinite, undeveloped source of people power.

SCHOOL AS A COMMUNITY CENTRE by L. Kirk

As in interested citizen in youth work for a number of years, as a member of the board of Parks and Recreation and as Chairman of that board for the past three years, I am vitally interested in the functions of parks and recreation, and as a taxpayer, I am equally as interested in an extended use of a city facility.

In the City of Sarnia our first agreement with the Board of Education for a park-school combination was drawn up in 1960. We have had for a number of years, a liaison committee of our board working with the liaison committee of the Sarnia Board of Education, prior to the inception of the Lambton County Board of Education. During that time a proposed policy of cooperative planning, financing, use and maintenance of facilities, by both boards was adopted. At one of their first meetings, the Lambton County Board of Education passed a resolution endorsing that proposed policy and that it would be continued with. I have taken the liberty of submitting a copy of that policy to my text today.

It seemed apropos that the day I received confirmation of this meeting from Mr. Orłowski, the quote in our local newspaper was from Vice-President Spiro T. Agnew, and I quote: "We must stop developing educational programs for twelve years or sixteen years or twenty years and start creating programs that gear themselves to useful, satisfying leisure." Gentlemen, it would seem as though we are gathered here together today to try and do just that.

For a school to be functional as a community centre for parks and recreation, certain changes in design are mandatory: certain changes in administration would be desirable, and mutual co-operation between parks boards and school boards in Ontario, would be Utopia.

The activities of a community centre are varied with each program and each group that participates. Not only that, but recreation programs are handled in community centres during the day as well as in the evening. A good percentage of the programming on our recreation department takes place in the afternoon. How can a school be designed first of all so that an outside group can participate in a program during school hours.

We have talked for years about school design and cooperative use, and how buildings should have exterior access so that an outside group might come in and use a large auditorium or gymnasium without virtually having access to the entire school: designed so that washrooms can be built near entrances

and exits so that these facilities can be used as well without using the school corridors: designed with exterior doors to washrooms that they might be used during the non-school hours by playground or park participants. This, Gentlemen, as far as I am concerned is only a beginning to be able to use a classroom for a meeting, or an all purpose room for a craft class, is only one half of the problem. If you are teaching something like ceramics, you will have area for a kiln as well as suitable storage room. A boy that is taking model airplane building, cannot at the end of a craft period, fold up that unfinished model and put it in his pocket. He has to have some place to store it and this is bulky storage which takes room.

All of these things can be solved with design, I am sure, but how do you get two public boards and administrative staff to co-operate when both feel they are going to lose their autonomy, and are hypocritical to the point where they agree at meeting, and disagree in lobby. The blame cannot be put on one or the other, they are equally responsible, and unfortunately the fine line separating the park from the school on paper becomes an invisible and unsurmountable barrier in the physical relief of development.

I wonder if the problems would be lessened if the local recreation department were responsible to the Board of Education as it is in many American cities.

I am sure everyone in this room is aware of the problems, the hurdles and the stalemates that we have encountered over the past years, in the design and extended use of school facilities.

The advent of Regional Government and the combining of Boards and Commissions is bringing all Government Bodies closer together. If nothing else, the escalation of costs and the increase in leisure time is going to force us to use every facility under our control for as many hours as possible.

I would hope from this Workshop there might come some good constructive exchange of ideas that will benefit the design of future schools in Ontario.

PROPOSED POLICY - CO-OPERATIVE PLANNING, FINANCING, USE AND MAINTENANCE OF FACILITIES BY THE BOARD OF EDUCATION AND THE BOARD OF PARKS AND RECREATION.

It is noted that the maximum use may be made by the Community of the grounds and facilities of the Board of Education and the Board of Parks and Recreation, and that this be at minimum cost to the Community, the following policy is agreed to by both Boards:

1. That when selecting new sites, full consideration be given to their future dual use for school purposes and for recreation use by the community at large.
2. That there be consultation with representatives of the other board when planning the development of parks, school grounds, new buildings or when planning major renovations or alterations.
3. That future schools or major additions to existing schools be constructed so that units for recreational activities such as auditoria, gymnasiums, all-purpose rooms, shops for crafts and certain washrooms, be located away from those parts of the building devoted primarily to educational purposes, and that these units be provided with ready access to the outside and with means of controlling traffic flow to the remainder of the school area.
4. That joint financing of facilities be considered where joint use is planned and where justification of the facility by one board alone is deemed to be impossible or very difficult.
5. That any joint athletic areas and campuses be under the jurisdiction of the Board of Education during school hours and under the jurisdiction of the Board of Parks and Recreation after school hours, such jurisdiction to include provision of any required supervision and the issuing of permits to use.
6. That Community use of Elementary School facilities such as all-purpose rooms and secondary school facilities such as gymnasiums and classrooms be strongly encouraged by both boards.
7. That maintenance of any jointly used facility be the responsibility of one board but that the cost be shared on an agreed upon basis.
8. That a meeting between representatives of both boards be held at least once a year to plan and discuss the capital budgets for the next five year period, and plan and discuss the operating budget for the forthcoming year and to prepare an agreement for ratification by both boards covering any joint financing of capital projects, joint use of any specific facilities and formulae for sharing of maintenance costs for the forthcoming twelve month period.
9. That a meeting between the two boards be held once a year preferably in the October/November period to review this policy and make any necessary changes and to communicate all future plans.

December 4, 1968

TEAM PLANNING IN CONSTRUCTION SYSTEMS FOR BUILDINGS by H.J. Vallery

Mr. Chairman, my task this morning is to describe the objectives and accomplishments of The Metropolitan Toronto School Board's Study of Educational Facilities. May I say how delighted I am to be here at Windsor, and to have the honour of speaking to this audience.

Metropolitan Toronto, as you know, like our higher levels of government is federally organized. The metropolitan area has six borough boards of education with their trustees elected every three years. Each board administers its local education system under a Director of Education with such powers as curriculum development, the hiring and promotion of teachers and non-teaching staff, the designing, building, and equipping of its schools, and providing for their maintenance.

Superimposed on these six borough boards of education is the Metropolitan Toronto School Board. Its membership consists of 18 trustees, chosen from the trustees of each of the six borough boards with each board represented in proportion to the population of the borough. The powers of this Metropolitan Toronto School Board are chiefly financial. It arranges for the debenturing of capital projects. As well, it raises current revenue through the establishment of the current or annual municipal tax rate for education. It distributes capital and current funds to the six borough boards according to the needs and priorities of each local board. It similarly determines the ceiling area and ceiling cost for all capital projects. The budget of the Metro Toronto School Board last year was approximately \$80 million for capital projects, and \$360 million for current operating needs. There are 450,000 students, 20,000 teachers, 2,500 officials, and 550 schools in Metropolitan Toronto. Each year the Board must build 20 to 30 schools, plus many additions and alterations. As well, there are some 1,200 portable classrooms accommodating some 40,000 students, and a bus fleet about the same size as that operated by the Toronto Transit Commission.

It was because of the Metro Toronto Board's responsibility for financing capital projects, as well as having to grapple with the problems of explosive population growth, capital shortage, a growing stock of portable classrooms and obsolete schools, while maintaining and advancing educational standards that the Study of Educational Facilities emerged. In Canada, as in the United States, educational directions and methodology are undergoing or will undergo drastic change. The Board knows that school buildings presently being built to last into the 21st century should be designed to meet changing and future educational requirements. For these reasons one of the chief responsibilities of the SEF project is to evaluate the directions which education may take in the future.

To meet these challenges and after investigating the School Construction System Development (SCSD) in California, the Metro Toronto School Board early in 1964 decided that a similar building systems project should be attempted in Metropolitan Toronto. The Board approached Educational Facilities Laboratories, which was financing the California SCSD project, and applied for EFL financial support. After a period of consideration, the Metro Toronto School Board approved the study of Educational Facilities project in 1964. An Advisory Committee to SEF was established, and on September 1, 1966, the joint directors of SEF, Mr. Roderick Robble as Technical Director, and I as Academic Director, opened the SEF office.

The SEF project was intended as a three-year study, and in 1969 was extended for an additional year under the original terms of reference.

The Metro Toronto School Board agreed to support the project financially, with the provision that financial grants received from other jurisdictions would be deducted from the Board's total financial commitment. EFL has been a tower of strength in its support of the SEF project, and since 1966 has underwritten approximately one-third of the total cost by a system of annual grants. The remainder of the cost has been borne by the Metro Toronto School Board. The projected cost of the study over the four-year period to August 31, 1970 is in excess of one million dollars.

SEF is both an educational and a technical study project, which for the last year has been translated into an actual building program. Under the direction of the academic and technical co-directors, its staff of educators, architects, and technical consultants have worked closely together in resolving many educational and technical problems.

The terms of reference for the SEF project are as follows:

1. Educationally - to define future educational activities and functions which will occur at the elementary, intermediate, and secondary school levels, and to define the amount of space, the degree of space flexibility, location factors of curriculum areas within a school, service requirements, physical environment, and equipment needs required in all areas of such schools. The needs of the total community with respect to school buildings are to receive major consideration.

2. Technically, the objectives of SEF are as follows:

- to apply the principle of modular planning and construction to school buildings in order to achieve greater flexibility of interior design,
- in developing a building systems approach to school construction, and to develop building components or building sub-systems through the preparation of technical performance specifications.
- using the above approaches to school construction and applying improved

management procedures, to see if school building costs can be reduced on the one hand, while on the other hand providing better value for expenditures in terms of educational functions, environment, and maintenance,

- to analyze the problem of short-term accommodation, including an evaluation of the present use of portable classrooms, and to consider alternatives,

- to investigate the possibility of mixed-use development of school buildings with commercial or residential structures. This particular study is of growing importance in Metropolitan Toronto, because in some parts of the area, boards of education are forced to pay up to \$500,000 per acre for school sites.

To review the detailed work of the SEF project, an Advisory Committee to SEF was created consisting of school trustees, representatives from the Ontario Department of Education and EFL, educators, architects, engineers, financial officials, a representative from the National Research Council of Canada, and executive officials of the Metropolitan Toronto School Board. The recommendations of this Advisory Committee are passed on to the School Board for final decision.

Over the past three years, my work has been most closely associated with the educational phase of the SEF project. I would now like to describe this educational work in some detail, and then in more general terms, describe the technical objectives and the development of the SEF building system.

Early in the educational phase of the project, a method of obtaining information concerning educational trends had to be found. In the first few months, many schools and school districts throughout Canada and the United States were visited. Concurrent with these visits, our research staff tackled a mountain of educational and architectural periodical literature to discern emerging educational and school building trends. We then structured approximately 30 educational committees involving about 300 people. On a regular and voluntary basis over the past three to four years, these committees have defined future educational trends and the needs of the curriculum in relation to future school design. Teachers, curriculum consultants, school principals, administrators, representatives from the Department of Education's Curriculum Department, and representatives from community affairs organizations are represented in these standing committees. The contributions and knowledge of these varied sources of information have given a practical flavour to our reports and their recommendations.

In Metropolitan Toronto, each of the six boroughs is committed to a three-level school system. We therefore decided to issue three educational reports each corresponding to a part of this tri-level school system. These reports

deal with the educational functions and user requirements in each of:

- a. Elementary (K-5 or K-6) Schools,
 - b. Intermediate (Grades 6-8; 7-8; 7-9-9) Schools,
 - c. Senior or Secondary Schools.
- The first two of these reports (SEF Report E.1 - Elementary Schools, and SEF Report E.2 - Intermediate Schools) are now published, and are available on order through The Ryerson Press, 299 Queen Street West, Toronto, Canada. The third report dealing with secondary school requirements will be published in the summer of 1970.

I would like to describe very briefly some of the premises on which we are basing our recommendations in these reports. First, and foremost among these is the premise that our recommendations should be set against the major change patterns affecting North American and world society. The directions of education are being profoundly affected by the tremendous population growth and mobility of people, by rapid urbanization, by industrial and technological automation, and by the information technology revolution. Man has entered the age of cybernation where the computer manipulates our machines and our productive output. The day when we needed vast hordes of semi-skilled machine operators is gone. The implications of these changes for education defy the imaginations. The goals and methodology of education cannot remain unchanging in a world which is tumultuously undergoing transformation at an unprecedented rate.

The attempt to define educational goals at the various school levels has been our most difficult task. In any list of goals defined by any educational authority, we will always find some variation of the statement that education is a process of conserving the past. Hence, many use teaching to fashion the young in the image of their elders, but neglect to ask if this perpetuation of the image is desirable. Education involves more than the transmission of past culture. It should be much more actively involved in the continuing creation of new culture. It is more than the transmission of factual information, or content. It is more than preparing young people to live with others, or to socialize. It is more than emphasizing process or the structure of subjects, or indoctrinating students in scientific methodology. Above all else, education should be a process of helping young people achieve personal autonomy and of searching for truth. It should involve the nurturing of curious and creative minds. It should assume that education begins with a question by one mind eager to learn. It should assume, as well, that learning takes place when a teacher allows the questioner to arrive at the answer for himself. The emphasis in education should change from what we know to what we can find out. We should be de-emphasizing content, and instead should be guiding and encouraging young people to question, to find out, to locate, to synthesize information, and to apply information to changing situations.

Far too few teachers think of themselves as people who should respond fully and openly to students' questions. Too many see themselves as society's representatives, and as experts telling students what the authority of society demands and is prepared to enforce. Many teachers fail to understand the world as it is seen through the eyes of the young. These young people, because of the marvels of electronic technology, see the world as a global village. They are aware of its hunger, its speed, its ease of mobility, its inhumanity, its injustice, its reliance on war as an instrument of politics, its avid desire to accumulate a wealth of material goods, its double standard system of honesty and morality, its change through technology, and the power exercised by its tradition-bound establishments. Our youngsters will not eagerly and positively respond to an education that is locked in tradition, and to an information system which is no longer adequate. Our school system, if it is to be effective, must adapt itself to the rapidly changing environment in which it functions. It must recognize that real learning begins with a student's question, rather than with a teacher's answer. Students who receive no hearing for their questions in schools, will soon find schooling highly irrelevant, and sooner or later will tune out, drop out, or rebel against the system covertly or openly.

Starting from the premise that learning is a process that begins with a student's question, rather than with a teacher's answer, the people involved in our project believe our schools require radical change, not only in respect to curriculum and methodology, but also in respect to their building design. May I mention just a few of these changes which have implications for building design, and which are at the base of our SEF recommendations.

We all know that children are distinct individuals. They have different interests and aptitudes, different socio-economic backgrounds, different rates of learning comprehension, and different ways of learning in response to different stimuli. We need to change the group orientation so characteristic of education. Our traditional and highly structured grade-classroom organization with its standard component of 30 to 35 students located in an enclosed classroom with one teacher, needs radical change. Such an organization cannot help but be oriented to group teaching, rather than to individual learning. This organization is so prevalent that the accepted manner of describing a school today is by the number of classrooms it contains. For the school designer, each classroom has represented a cellular order of space, and for the educational administrator, it has represented the easiest way to organize and administer educational units. Such thinking and such design have resulted in the so-called "eggcrate school", seemingly based on the assumption that education is a constant and will not mutate.

The school designer should assume that education in future schools will rest on the process of learning, rather than exclusively on that of teaching. There will be much less need of having students receiving instruction from

a teacher in fixed, enclosed locations capable of seating 30 students. The designer should assume that our highly structured grade organization will become ungraded, and that many flexible forms of organization and scheduling will occur, so that students may proceed at their own interest and achievement rates. Many groupings of students will occur, other than the traditional 30. These groupings will vary according to subject material, age range, achievement levels, physical characteristics, attitudes, interest, teacher ability, technological equipment, availability of different kinds of learning spaces, and the number of para-professional staff. Groups of two or three, six or seven, or ten or twelve students will do projects, discuss, or plan. Single individuals will engage in independent study, reading, listening, or viewing. Large groups of up to 30, 40, 50 or 100 students or more may be organized for audio-visual presentation, ETV, singing, student presentations, or listening to special lectures and speakers. Rather than being based on 40 or 50 minute periods, time will be blocked in variable modules in the master timetable to certain areas of the curriculum. The teachers will group and re-group the students many different times, in many different ways, and in many different sizes of groups. The need for flexible space, which can quickly, efficiently, and economically change form and size, will be the greatest single challenge facing school designers in the future.

In these non-graded schools, co-operative teaching will replace the traditional organization of one teacher assigned to a classroom group of 30 students. Instead of working independently and in isolation one from the other, four or five or more teachers with para-professional help will be working with 100 or 150 or more students. The teachers will be pooling their respective abilities, knowledge, and skills to effect real improvement in student learning opportunities. In these situations, teachers will plan and implement the learning program co-operatively. They will observe and learn from each other. They will make curriculum adjustments, move students from group to group, share instructional tasks, make more balanced evaluations of each student's learning progress, and plan for more efficient use and sharing of learning materials and equipment. An intern or apprentice teacher in such a setting will have the opportunity to observe and to benefit from the guidance of several teachers at once. It will only be by breaking down the graded structure and the classroom walls that teacher isolation will end. In designing schools, architects should plan teacher workroom and planning areas close to the learning centres to which teachers are assigned.

Regardless of the school level, the non-graded school will require a wealth of both print and non-print materials. Greatly improved, enlarged and properly staffed library resource centres, capable of serving the independent study needs of our young people and the community, will be necessary. Similarly, listening, viewing, and computer instruction stations, closed circuit television facilities, and the use of ordinary audio-visual equipment

will require detailed planning by the design team. No school should be designed without planning for a built-in electronic capability for use now or in the future.

In planning for tomorrow's schools, much more awareness of community needs will be required. The community pays for and owns its schools. The design team should include representatives of the community. Facilities needed by the community for recreation, creative purposes, counselling, learning, retraining, and health should be made available in the school. These facilities should be so located that they may be used long after school hours and during the whole year. Thus gymnasias, science laboratories, art and music areas, drama facilities, library resource centres, second language facilities, counselling offices, health centres, home economics, business education, and technological education areas should not only be accessible and open to the whole community, but also constructively planned and designed for their use.

The composition of the design team planning a new school is of the utmost importance. In the past, the weakest link has been the role played by educators. Those of us who have been teachers have spent much time condemning architects and especially electrical and mechanical engineers for serious flaws in space and service designing. In reality, many of these flaws could have been avoided, if the educator had learned to become proficient in the field of educational specification writing. The educator should be involved as a member of the design team right through to the end of the sketch and working drawing plans. He should understand the technical parameters which may limit his educational recommendations. For his part, the architect should be willing to modify his preconceived notions of the way in which a school operates, and should be flexible enough to design schools capable of economical change. In my opinion, designing for educational functions and user requirements, as well as economic planning should take precedence over an architect's aesthetic sensibilities.

A new kind of school design will be required to accommodate the varied programs and variable sized groups in the non-graded school. The interior of such schools must be capable of easy and economical future design change. The interdisciplinary nature of knowledge should be recognized by the adjacent location of related areas of the curriculum. Longer structural spans, fewer bearing walls, open learning spaces, enlarged library resource centres, the careful planning of service requirements, the use of demountable or operable partition systems, easily adjusted ceiling-lighting, mechanical, and electrical systems, a controlled climate environment for year round use, careful consideration of acoustics, and easily moved furniture and casework units are major requirements. Since educational requirements will continually change, the interior of a school must be capable of easy and economical rearrangement of space and services.

It became obvious early in our work that the development of the building system could not wait for the completion of the three educational user requirement studies. It was decided that both the educational and technical studies should overlap and parallel each other feeding information to the other in a continuous fashion. I would like to describe very briefly some of the highlights of the SEF building system which have developed since 1967.

First of all, the SEF building system may be described as an "open" building system. Unlike a closed building system, where only one set of major components is designed with each integrating with the other, an "open" system is one where many different components, manufactured by many different companies are compatible one with the others. In a closed building system, the client must purchase the components specified, but in an open system the client's requirements may be met by three or four, or more components manufactured by different companies. To develop this open building system one of SEF's first responsibilities was to develop a large enough market to justify product development work on the part of industry. SEF canvassed 270 companies and contractors in early 1967, and held 120 meetings during that year with every representative interest in the building industry. The building industry was asked not to innovate technically when bidding the First SEF Building System, but rather to rationalize the skill, techniques, plant, and capital resources it already possessed into a truly modern and efficient productive system.

To attract industry to this approach, the Metropolitan Toronto School Board guaranteed a minimum order of one million square feet of construction for a two-year period (September 1969 to September 1971) with an order ceiling for the same period of two million feet. The response of the building industry to this open building approach has been excellent.

During 1967-68, performance specifications were written for a building system comprising 10 sub-systems, and a non-system category. Two of the sub-systems were further sub-divided giving a total of 14 sub-systems. In addition, the tendering method and all aspects of the conduct of the bid were described in detail in SEF Document T-1, Introduction to the First SEF Building System, which with SEF Document T-2, Specifications for the First SEF Building System and The Bidding Sheets for the First SEF Building System, constitute the contract documents for the program. These documents may be purchased from the SEF office, 49 Jackes Avenue, Toronto 290, Ontario, Canada.

The first SEF Building System comprises the following sub-systems:

No. 1	-	Structure
No. 2	-	Atmosphere
No. 3	-	Lighting-Ceiling
No. 4	-	Interior Space Division
No. 5	-	Vertical Skin
No. 6	-	Plumbing

No. 7	-	Electric-Electronic
No. 8A	-	Caseworks
No. 8B	-	Seating
No. 8C	-	Standard Furniture
No. 9	-	Roofing
No. 10A	-	Carpet
No. 10B	-	Gymnasium Flooring
No. 10C	-	Hardware

These sub-systems constitute approximately 80 per cent of the finished cost of a school.

In 1967 - 1968 the SEF specifications were sent to 1,000 representatives of the building industry for review and criticism, and were duly revised as a result of this process. In 1968, the Metro School Board increased its basic order to two million square feet, comprising 31 schools and one office building for construction during the period September 1969 - 1971.

Tenders for the system were called on July 9, 1968 and closed January 7, 1969. Tenderers were restricted to prequalified bidders only. Sub-system tenderers, who were most typically consortiums of trade-subcontractors and manufacturers, were prequalified with respect to their financial status, production, and installation capacities. The mid-term review half way through the tendering period evaluated their technical abilities. Of the sixty potential bidders who sought prequalification, forty-eight were prequalified, and thirty-six submitted forty-five proposals for ten sub-systems on January 7, 1969.

In February, 1969, the Metro Toronto School Board designated one bidder in each sub-system. Together these contractors under the direction of the SEF staff as architects, and a management contractor as construction co-ordinator, were required to construct a building to demonstrate the technical compatibility of their sub-system proposals before receiving the contracts for the total program of 31 schools and 1 office building. A 13,000 square foot addition to the Eastview Public School in Scarborough was selected for this purpose.

The SEF bidding system was based on a series of mandatory interfaces of sub-systems. A mandatory interface occurs when the parts of one sub-system touch, pass through, or are connected to the parts of another sub-system in a finished building. Under the interfacing bidding system, each sub-system bidder gave his price on the assumption that the owner would be considering at least two other bidders in each mandatory interface. The effect of this bidding method was to bring into being the first true open building system in construction history. To evaluate the bid, just over one million interface bidding combinations were considered, revealing 13,040 complete building systems which met the SEF performance specifications. These systems ranged in price from about \$18.00 per square foot gross for a building, including

foundations, carpet, built-in equipment and caseworks, to \$26.61 per square foot gross. The cost of \$18.00 per square foot assumed that the most efficient building design would be used. After allowance was made for architectural design, a SEF building cost was set at \$19.10 per square foot gross. This cost is applicable to elementary and intermediate schools and compares to the original project budget of \$20.85 per square foot gross, representing an overall saving on the SEF schools of 8.39 per cent.

The gross budget for the SEF system schools was \$41.7 million, the value of the sub-system proposals offered if tendered by traditional means would have been \$52 million, and the designated sub-system cost will be \$38.2 million. In general terms, the Metropolitan Toronto School Board obtained about 30 per cent more value for 8.39 per cent less cost than by traditional means.

Twenty-six firms of architects were retained early in 1968 to prepare sketch drawings for all schools in the program. These designs reflected the differing educational philosophies of the six borough boards of education and the influence of varying site requirements. All designs were prepared within the 5'-0" x 5'-0" horizontal planning grid requirements of SEF, its standard floor to ceiling heights of 10'-0", 14'-0", 18'-0" and 24'-0" and standard roof and floor thickness of 4'-0". Architects designed their buildings on the assumption of framed roof and floor structures offering primary structural spans of from 10'-0" to 30'-0" by 5'-0" increments, with secondary structural steel and floor spans of from 5'-0" to 65'-0" by 5'-0" and 10'-0" increments, with a common live load for floors of 100 lbs. per square foot in structures up to five stories. The architects were also told to assume full air-conditioning and carpeting, and 100 per cent relocatability of all interior walls and partitions, lights and ceilings, electrical and electronic services, air conditioning terminals, educational and storage caseworks and limited relocatability of the plumbing sub-system. The resulting sketch designs were published in SEF document T-1 and used for the establishment of quantities.

With the final designation of the successful sub-systems, the architects are now revising their designs to exploit the First SEF Building System fully.

In April, 1969 general contractors were invited to seek prequalification to act as construction managers for the first eleven schools to be built under the program. In June the borough boards of education each appointed one contractor to carry out their work in the 1969-70 (first year) of the SEF program. A similar invitation to contractors for the balance of the program will be made in 1970 for the 20 buildings to be built in 1970-71.

By the summer of 1970, the first 11 schools, representing some 750,000 square feet of construction, will be finished. The SEF Test School, Ryden Public School, will be finished this month which is a remarkable achievement since construction of this 80,000 square foot school did not start until September, 1969.

The total SEF program which is scheduled for completion by 20th July, 1971 will probably have the following composition:

- 1 addition the SEF technical test structure Eastview S.P.S. Scarborough equivalent to 8 traditional classrooms.
- 23 elementary schools including the SEF Test School. This school will test both the educational theories, and building system of SEF
- 6 intermediate schools
- 2 high schools
- 1 education centre - office building

After fully testing the sub-systems used in the SEF Test Structure, the Metropolitan Toronto School Board on October 28, 1969 awarded contracts to the designated SEF sub-system contractors as follows (except for 8A-Caseworks which was awarded in November, 1969):

(Structure)	Sub-System No. 1	-	Anthes-Canron Consortium
(Atmosphere)	Sub-System No. 2	-	Canada Electric Co. Ltd.
(Lighting-Ceiling)	Sub-System No. 3	-	Canadian Johns-Manville Co. Ltd.
(Interior Space)	Sub-System No. 4	-	Westeel-Rosco Ltd.
(Vertical Skin)	Sub-System No. 5	-	Beer Precast-Precon Murray Ltd.
(Plumbing)	Sub-System No. 6	-	H. Griffiths Co. Ltd.
(Electric-Electronic)	Sub-System No. 7	-	Industrial Electrical Contractors Ltd.
(Roofing)	Sub-System No. 9	-	Dean-Chandler Co. Ltd.
(Carpeting)	Sub-System No. 10A	-	Perfection Rug Co. Ltd.
(Gym Flooring)	Sub-System No. 10B	-	Minnesota Mining and Manufacturing of Canada Ltd.
(Hardware)	Sub-System No. 10C	-	Architectural Hardware Ltd.
(Casework)	Sub-System No. 8A	-	McIndoo Ltd.

This, then, is an outline of the work accomplished by SEF since 1966. The first phase of SEF schools will be ready for their users in 1970. During the latter part of 1970, it is planned that an exhaustive evaluation of the SEF educational and technical recommendations as evidenced in these schools will be undertaken. My question is, will these schools be used by their students and teachers to their full potential? Will the users be aware of the responsiveness of the building system, and how in a school system as

large as that of Metro Toronto do you communicate with the users of these buildings? Faced with the reality of truly flexible space which may be open or closed, will teachers and students still cling to their practice of teaching and learning in an enclosure? Unless teachers, principals, and administrators fully participate and co-operate in planning and new learning approaches in flexible space, and are fully committed to the success of the new programs, the whole SEF project and others like it could be placed in some jeopardy.

I can only conclude by saying, Mr. Chairman, that the day for serious and prolonged educational planning has arrived.

TEAM PLANNING IN CONSTRUCTION SYSTEMS FOR BUILDINGS by J. U. Moreau

It gives me great pleasure to address the distinguished group forming this Workshop, but Dr. Côté, my president who unfortunately has not been able to attend as planned, should really be the one talking to you on the team work that went into play in the development of the R.A.S. school construction system in Montreal. In fact Dr. Côté has been the spirit behind the team of the RAS project right from its very beginning and I wish to express to you his best regards and his regret for not being here today.

Some three years ago, the Montreal Catholic School Commission, recognizing the inadequacy of traditional school design concepts and wishing to cope with the existing demographic pressures on school construction programs, set definite objectives for a research program to cover:

- 1) Development of systems and over-all structures to meet specific new educational requirements.
- 2) Use of the modular principle, providing for savings due to pre-fabrication and ensuring the maximum degree of flexibility in the utilization of premises.
- 3) Reduction of construction and maintenance costs of educational equipment through standardization by ensuring a maximum return from the point of view of the initial investment, on educationally productive environment and minimum maintenance costs.

The research project entrusted to IRNES was called the RAS project for Recherches en Aménagements Scolaires which is Research in School Facilities.

The team assigned by IRNES to this work was multi-disciplinary and consisted of educators, economists, sociologists, architects and civil, electrical and mechanical engineers.

An investigation of the entire spectrum of educational problems was carried on with the input from thirty five different academic committees. The end result of this investigation confirmed that the constant evolution of teaching methods calls for physical installations with the highest degree of flexibility as well as multi-purpose uses.

Economic considerations and cost limitations imposed by the Provincial Department of Education required that such features of the physical installations be obtained at a cost lower or at least equal than prevailing unit costs for school construction.

The challenge was in fact better schools at a lower price.

After a great deal of research and investigation of almost all school construction methods tried in Canada and abroad, IRNES felt that an industrialized construction system was the best approach for meeting the previously mentioned challenge.

The rules of the game had to be laid out for all participants and these rules followed three basic principles.

- One - Modular Coordination
- Two - Integrated Components
- Three - Uniform criteria for design and quality

For modular coordination the international module of 4" (or 100 mm) was judged small enough to permit freedom of design and large enough to suit location of elements and assembly details. Multiples of this basic module were then determined as 5 m or 20" for the horizontal module of integration and 2 m or 8" for the vertical modules.

The number of integrated components forming the system was for a number of reasons set at five:

- | | | |
|-----|---|-----------------------------|
| ST | - | Structure |
| CVR | - | Heating-Ventilation-Cooling |
| PE | - | Ceiling-Lighting |
| CL | - | Partitions |
| SEE | - | Electrical-Electronics |

These components not only had to be fully integrated between themselves but they also had to provide for integration of non system elements.

Through a process of normalization, uniform criteria were developed to guide design and ensure the required quality control. The norms covered:

- Dimensional criteria
- Technical calculation criteria
- Performance criteria
- Esthetic criteria
- Flexibility criteria for ease of displacement and reorganization
- Criteria for admissible deviations and tolerances
- Quality testing criteria

A Performance Specifications as opposed to descriptive specifications, embodies all the previously outlined rules for their communication or prospective bidders.

Bids were received by the Montreal Catholic School Commission on

January 21st, 1969, for a total of 55 components grouped into 11 integrated systems offering a wide variety of structural, mechanical, electrical, ceiling and partitions, all of which when forming a system met the performance specifications.

The lowest bid was from the Francon group which integrated:

- | | | |
|-------------------------|---|-----------------------------|
| Francon Co. Ltd | - | Structure |
| Lennox Industries | - | Heating-Ventilating-Cooling |
| Electrolier Corporation | - | Ceiling-Lighting |
| B.K. Johl Inc. | - | Partitions |
| Bedard-Girard Ltée | - | Electrical-Electronics |

For the 3,000,000 sq. footage of schools included in the contract a saving of approximately 12% was possible over the prevailing conventional construction costs for the elements replaced by system components.

At the time when the bids were presented to the M.C.S.C. there happened to be administrative changes being studied for the restructuring of education in greater Montreal, the effect of the "Pill" was already showing on "figures" and thus on projected school populations, and financing interest rates were going up and up. This had the uncontrollable effect of delaying the construction program for about a year.

However, at the present moment the development phase is well underway with a full scale model 30' x 60' almost completed and tests are underway. Negotiations are also underway for the actual construction of the proposed 3,000,000 sq. ft. of schools, the construction drawings being finished for the first one of 19 schools, called the Pilot School.

In a few moments I will project for you a few slides showing the physical aspects of the components and their integration. This should leave you with enough time to ask any question which this very brief outline could not possibly cover.

May I mention that the RAS project qualified for a grant of 1/3 of its cost from the Educational Facilities Laboratories Inc. a body sponsored by the Ford Foundation, and that IRNES always had full assistance from EFL in its investigation of existing systems and other pertinent data. The RAS project was also conducted during approximately the same period of time as the Toronto S.E.F. project and full collaboration always existed between the Toronto and Montreal organizations.